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A Balance Wheel Failure That Was Not an Explosion.

BY W. H. WAKEMAN.

About 9 o'clock on the evening of June 22 the balance wheel on a rolling mill engine in a New England city failed under conditions that are worthy of notice.

The cylinder of this engine is 24 inches, the stroke 48 inches, and the speed, controlled by a shaft governor, varied from 45 to 70 revolutions per minute, according to the kind of work done. At the time of the failure the engine was running at 60 revolutions. The fly-wheel was 15 feet in diameter, cast in solid halves and bolted together in the usual way, with a face 25 inches wide carrying a 24-inch belt and transmitting power to a line of shafting for use in various parts of the mill. Between this fly-wheel and the outside pillow block there was a balance wheel 17 feet 8 inches in diameter, with a rim 13 inches thick and 12½ inches wide. It was cast in eight sections, the ends bolted together by two large bolts at each joint. An arm was cast in the center of each section and where it entered the hub it was fastened by two 1⅞-inch bolts. These arms were assisted by wrought iron rods 1½ inches in diameter, with round heads let into the rim in such a way that each rod held the ends of two sections, as shown in Fig. 1. These rods were fastened into the hub by means of flat keys. Power is transmitted from the engine to a train of rolls by a dental coupling on the outer end of the crank shaft, with three teeth in each half, and called a "crab" with three "lugs" in the vernacular of the rolling mill operators. It appears that one of the three lugs on each side was broken off some time since, but it was not considered necessary to replace it at once, so that at the time of the accident the whole load was carried by two "lugs," the dimensions of each being given in Fig. 2. One of these broke off suddenly and without warning, causing the end of the crank shaft to be carried up over the end of the roll shaft, breaking the heavy cap on the outside pillow block and raising the bottom half of the box out of its place. The effect of raising one end of the crank shaft a foot or more above its normal position was to bring the rim of the balance wheel into contact with a side of the pit in which the lower part of it traveled, the great stress so provided breaking six of the arms near the hub, leaving two intact. The fractured arms show clean, fresh breaks of good iron, with no indications of old fractures. The dimensions of these arms where broken are given in Fig. 3. The engine was immediately shut down, so that no further damage was done.

This mill has orders that would have kept it in full operation for many weeks, but it must now shut down for repairs. Suppose that when the outer end of the crank shaft was lifted out of place it had

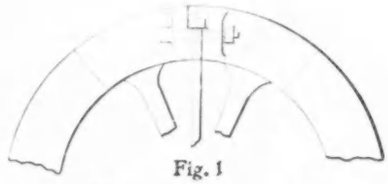

Fig. 1

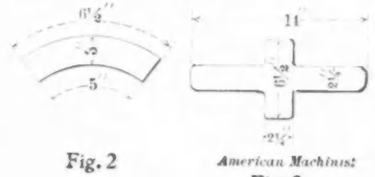

Fig. 2

Fig. 3

A BROKEN FLY-WHEEL.

cramped the shaft governor, rendering it inoperative and allowing the speed to increase beyond the safe limit for the partially disabled wheel; as the engine is located in the midst of much machinery and many men work in the immediate vicinity much damage would have been done, and perhaps some lives would have been lost. Would not the whole affair have been classed with the mysterious fly-wheel failures that have wrought death and destruction in some of our mills during the past five years? When the discovery was made that one of the "lugs" in the "crab" was broken would it not have been good policy to have shut the mill down for repairs without delay?

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We have become so accustomed to making everything by machinery that it now seems quite natural to make history by machinery, *i. e.*, battleships.

The Tropenas Process of Steel Casting.

The following information, abstracted from a paper presented at the Cincinnati meeting of the American Foundrymen's Association by Alexander Tropenas, will doubtless be of interest to many of our readers. The facility with which, at comparatively small expense, the process may be employed in the ordinary iron foundry must commend it to serious consideration. The process has been successfully put in operation in Great Britain and in most European countries, while at least one plant in the United States (for the Driggs-Seabury Gun & Ammunition Company, Derby, Conn.) is ready to start, so that it is no longer in the experimental stage.

The Tropenas process consists in the use of a special converter, in which the pig iron, melted beforehand, is treated and converted into steel. This vessel, like all other converters, is a sheet steel shell, lined inside with refractory bricks of ganister. The shell is fitted with two hollow trunnions, carried on two pedestals, so that the apparatus may be tilted according to the requirements of the operation, *i. e.*, charging the melted pig iron, pouring the steel, etc.

Upon one of the faces of the converter, and in a plane parallel to the axle of the trunnions, are fixed two wind boxes, connected by a conduit to the hollow trunnion communicating with the blowing apparatus. Inside of the lower wind box a row of horizontal tuyeres terminate, from 1¼ to 2 inches in diameter. They open into the converter high enough to be always above the surface of the metallic bath.

In the upper wind box a second row of tuyeres is placed; they are flattened, and their free section is equal to about three-fourths of that of the lower tuyeres. This row of tuyeres is placed above the lower row. The upper wind box is connected to the air main by an independent pipe, fitted with a valve, allowing to regulate at will the flow of air discharged by the top tuyeres, or to suppress it entirely. All the tuyeres are so placed that they cannot communicate any gyratory motion to the metallic bath.

When the melted pig iron has been run

into the converter, the latter is turned up in such a manner as to bring the lower tuyeres near the metallic bath, but always above it. The top tuyere air valve is now closed. Then blowing is commenced in this position until the carbon flame appears. When the operation is well under way, the top tuyere valve is opened, so as to admit through these tuyeres a supplementary quantity of air, which penetrates into the converter at a certain hight above the metallic bath. This air meets the gases escaping from the metallic bath, and burns them, thus producing a zone of high temperature, which, by radiation, considerably increases the heat of the charge.

The operation is stopped when the flame disappears—this corresponds to extra soft steel. Re-carbonization is then made in the converter by means of a final addition, accurately weighed, thus allowing to produce exactly the hardness and quality of steel required.

The blast pressure required for good working varies between 3 and 4 pounds, according to the kind of pig iron treated.

The characteristic features of the Tropenas process are the following:

1. Low pressure blast, always above the surface of the metal, and through the lower or "fining tuyeres."

2. Disposition of the tuyeres in the horizontal plane so that the jets of air arriving above the bath cannot impart to the latter any gyratory motion.

3. Great depth of the metallic bath, so as to avoid churning and stirring of the latter during the operation.

4. Arrangement above the "fining tuyeres," and independent of the latter, of a supplementary row of "combustion tuyeres," so as to burn the combustible gases escaping from the metallic bath, and thus increasing the final heat of the steel.

Blowing above the surface gives a much better quality of steel than the other pneumatic processes, which blow from the bottom, or more or less below the surface of the metallic bath. During the whole time of the Tropenas operation the bath remains perfectly quiet, and this is entirely different from all the other processes in which a continuous mixture of metal scoria and air takes place. The steel produced by our process is pure, and contains hardly any gas in dissolution. The operation being particularly quiet, there is no projection of steel, or very little, through the neck of the converter.

By the use of the top tuyeres the carbonic oxide (CO) arising from the metallic bath is transformed into carbonic acid (CO_2), thus greatly increasing the temperature of the final steel without increasing the cost price. The steel obtained being hotter, and consequently more fluid, allows the gases to escape more easily, and when the metal is poured into the molds it is perfectly quiet. Owing to its high temperature and consequent great fluidity, the pouring is much easier, and the steel produced is better utilized, as no skull remains in the bottom of the ladles.

At the end of the Tropenas operation, before any final addition is made, the product obtained is practically pure iron. This enables us to produce currently a very large number of steel castings for dynamos and other similar uses, possessing a very great magnetic permeability, and which when analyzed show from 99.75 to 99.80 per cent. of pure iron. These pieces are particularly sound, and when machined show no blow holes or similar defects.

It is easy to understand that the Tropenas metal, produced in such a state of great purity and at such a high temperature, enables us to make the most varied final additions with the view of producing different qualities of steel, from the softest to the hardest, and all the intermediate grades; this being obtained by merely modifying the final addition, according to the product required.

It is necessary to observe that, though the metallic bath is practically quiet during the operation, the reactions caused by the "fining" blast are quite sufficient to secure a perfect homogeneity of the charge. This is clearly demonstrated when we pour a 2 ton heat into hand ladles for manufacturing small pieces. The steel from the first to the last ladle is absolutely the same.

The working of the Tropenas converter in not difficult. It requires of course some knowledge, but any intellligent foreman can be taught in a few weeks the management of apparatus.

Practice has shown that the products obtained are very regular, and the signs of the operation are so clear that it is very easy to stop it at the proper time without the use of the spectroscope, when the metal is then completely decarbonized, and contains but very small quantities of the elements originally held in the pig iron. The bath at the end of the operation, being merely liquid iron, practically pure, it is a very easy matter to add a known quantity of final addition to obtain exactly the hardness and quality wanted.

The waste of metal during the operation has been the object of special researches. The average, taken from a great number of operations, show that the loss at the cupola varies between 5 and 6½ per cent. The waste at the converter, during the blow, varies between 10 and 12½ per cent. The average total loss in the cupola and converter is therefore about 17 per cent.

The pig iron usually employed by us for manufacturing steel castings has the following analysis:

Silicon.....from 2.50 to 3.50 per cent.
Manganese....from 0.50 to 1.25 per cent.
Carbon.....from 3.00 to 4.50 per cent.
Sulphur.....from 0.03 to 0.06 per cent.
Phosphorus....from 0.04 to 0.07 per cent.

When the steel produced is to be submitted to particularly severe tests it is better to use a pig iron as devoid as possible of sulphur and phosphorus.

The sands necessary for making molds are silicious sands, containing a sufficient proportion of alumina to give the molds the required hardness. We do not give any analysis, because we have generally found suitable natural sands in all the countries where we have erected our steel plants. Anyhow, it is possible to obtain what is required by a judicious mixture of the different kinds of sands available.

All machinery castings having to be machined upon several faces must be cast in dried molds, also large castings with great thicknesses. Less important castings, for which slight defects, such as pinholes, slight scales, etc., are not a sine qua non condition, are cast in green sand molds not dried. In the majority of foundries using our process a great proportion of the castings are cast in green sand molds not dried or merely skin dried. The greater part of the small castings are cast in the same manner.

The steel as it comes from the converter is perfectly soft and malleable. The great majority of castings delivered to the trade are neither reheated nor annealed. When pieces, however, have great or uneven thicknesses, or when they are of a great bulk, it is preferable to reheat them for a few hours at a cherry red heat in an ordinary furnace, without the use of any iron ore or other recorbonizing elements. The object of such a reheating is simply to transform the crystalline structure of pieces having great thicknesses into a finer grain, or to receive the molecular tensions due to the considerable shrinkage of steel when the castings have a great bulk. Reheating is also necessary when high mechanical results are to be obtained, and principally when a great elongation is required.

The installation of the steel process proper requires first, one or several converters, according to the quantity of steel to be produced. Each converter works in connection with a cupola; the latter is generally placed upon a metallic platform, high enough to allow the melted pig iron to run direct from the cupola into the converter.

The air blast for the converter can be produced by means of a rotary positive pressure blower, the air pressure being only from 3 to 4 pounds per square inch. The quantity of compressed air required is from 22 to 25 cubic meters per minute (776 to 883 cubic feet) per ton of pig iron to be treated.

The expenditure necessary for a plant consisting of two 1-ton converters, two cupolas and their platforms, fans and rotary positive pressure blower, is about $6,500, erection included.

The cost of two 2-ton converters, two cupolas, platforms, fans and blower is about $8,500, erection included.

To this must be added the cost of a crucible furnace for final additions, which we generally add in a melted state. The expenditure for such a furnace is a small one, and does not exceed from $150 to $200. Besides the steel producing plant proper, the usual foundry apparatus are necessary.

The operation on each charge in the converter lasts from fifteen to twenty minutes; some time is required for pouring the steel into the molds, and for preparing the converter for another blow. We reckon when small pieces are manufactured and the whole charge has to be poured by means of hand ladles, that forty minutes are necessary for a complete operation. When the pouring is made with large ladles it requires only thirty minutes.

The converter lining lasts from 125 to 150 operations; the tuyeres from thirty to forty operations, after which the latter must be replaced. While this is being done the necessary patching up of the lining is made according to requirements. If some holes have been formed they can be plugged by means of a mixture of cement and brick.

The linings are made with silica bricks, the cement being composed of quartz, sand and clay.

The cost of producing the steel varies from $5 to $6 per ton of 2,200 pounds over and above the cost of pig iron; this includes all expenses incurred at the blowing apparatus, cupolas, labor, lining, tuyeres and all general expenses for the manufacture of the steel in the ladle ready to pour.

Our steel being very hot and very liquid it is easy to cast all kinds of small pieces very thin, and this is done without loss of metal.

Our process is perfectly suited for all these requirements, because of the great advantage it offers of being able to take from the converter small quantities of steel, exactly what is required for filling mold, then to tap the vessel again for the quantity of steel necessary for another casting, and so on. With our process we can, without any inconvenience whatever, cast very large pieces in a practical manner and still remain well adapted for producing average and small castings. We very often run in the same ladle three, four and five successive melts, and use the total melt to cast one piece, and this we do without any loss of material from ladle bottom skull, etc. Our steel is so hot and so fluid that it can be kept very long in a ladle without becoming pasty.

Lastly, our castings of ordinary soft quality weld as easily as iron, and they can be welded together or to iron exactly as the best soft steels produced so far by the basic processes.

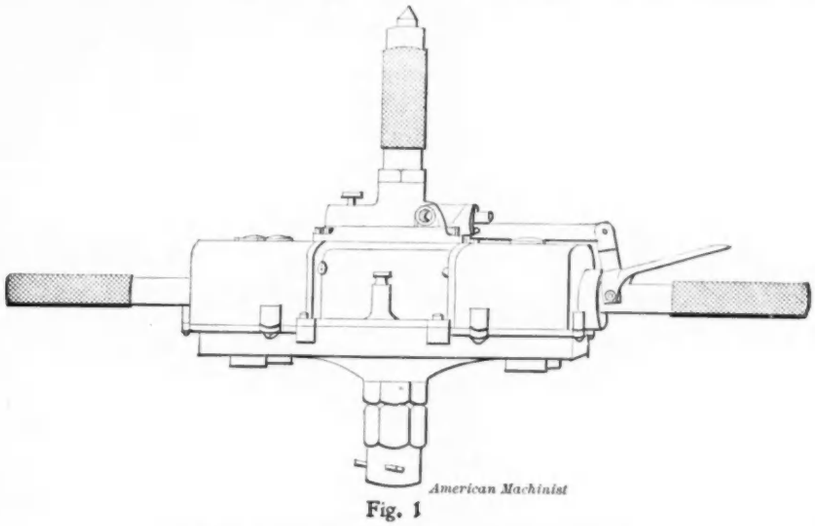

Fig. 1

DRILL WITH FOUR RECIPROCATING PISTONS.

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Shop Tools Driven by Compressed Air—V.

We have already in this series illustrated and described two portable drills, of different makes and in established use, driven by rotary motors. There are now several other competitors with the same general features and with perhaps little to choose between them as to practical serviceability, and it is not necessary to give a complete description of each. The rotary motors employed, while well made in each case and each doing the work promised, are still rotary motors not exempt from some of the objectionable features which seem to be inseparable from them. Even if otherwise good enough they at least have to encounter the prejudices against them which most experienced mechanics ntertain. It was to be expected that, although in this field the rotary motor was distinctly the pioneer, its occupancy would not long endure unchallenged. We have now accordingly a number of portable drills intended for precisely the same line of work, drilling, tapping, reaming, running in stay-bolts, etc., but operated by reciprocating pistons and cranks and gearing.

The cuts show two interesting machines of this class. They are not only

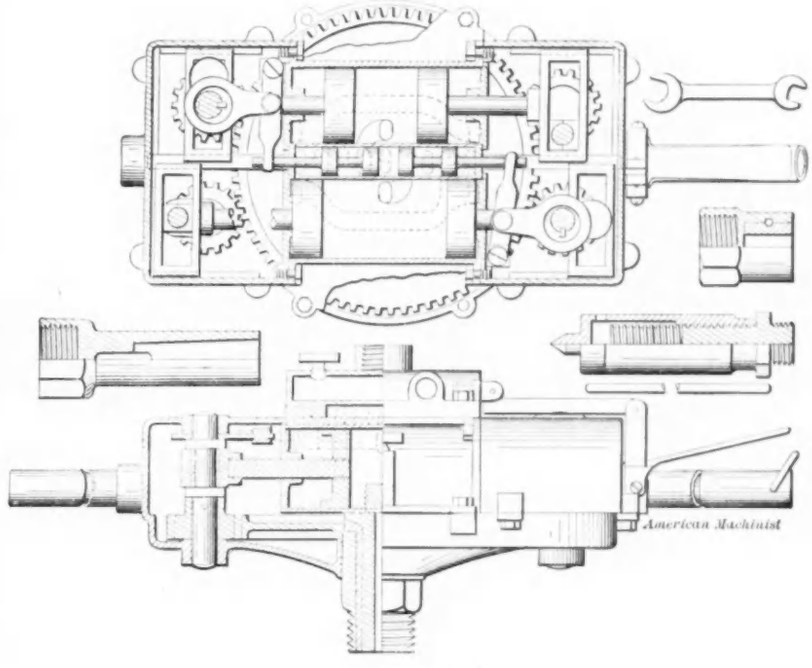

Fig. 2

DETAILS OF MOTOR WITH FOUR PISTONS.

efficient within the range of their work, but they are of great interest in their design and construction to the general mechanic. Fig. 1 shows the Phœnix Pneumatic Tool No. 5 for heavy drilling. It weighs but 40 pounds, and drills up to 2½ inches diameter. Fig. 2 shows very clearly the construction of this drill, the upper figure being a plan and the lower figure partly a vertical section and partly an elevation. Referring to the plan it will be seen that there are two operating cylinders, with two pistons for each. A piston rod passes out through each end of each cylinder, the rods carrying on their outer ends Scotch yokes in which the crank pins of the four pinion-shafts play. The pinions all mesh into the large central spur gear which is on the spindle which carries the drill socket. The teeth of the pinions are placed so that the cranks for one cylinder are at right angles to those of the other cylinder, and there is no dead center. The pistons are double acting, the pressure being between the pistons as they move outward and between the pistons and the cylinder heads as they move inward. The movements of the pistons thus perfectly balance each other. The distribution of the air is effected by two piston valves in the valve cylinder between the main cylinders. One of the valves is operated by an eccentric upon the upper left hand crank-shaft and the other by a similar eccentric on the lower right hand shaft. The air is admitted through one of the handles, with the usual thumb-operated throttle, and discharged through the other handle. The drill spindle is in the center of the machine, and all the parts are symmetrical and balance each other. A similar machine much smaller than this is made for breast drilling (which no mechanic has ever learned to enjoy) or for use with an "old man." This little drill, which weighs only 20 pounds, has two speeds, and is intended to drill up to ½ inch as a breast drill, or to ⅞ inch when a means of holding the central pressure is provided.

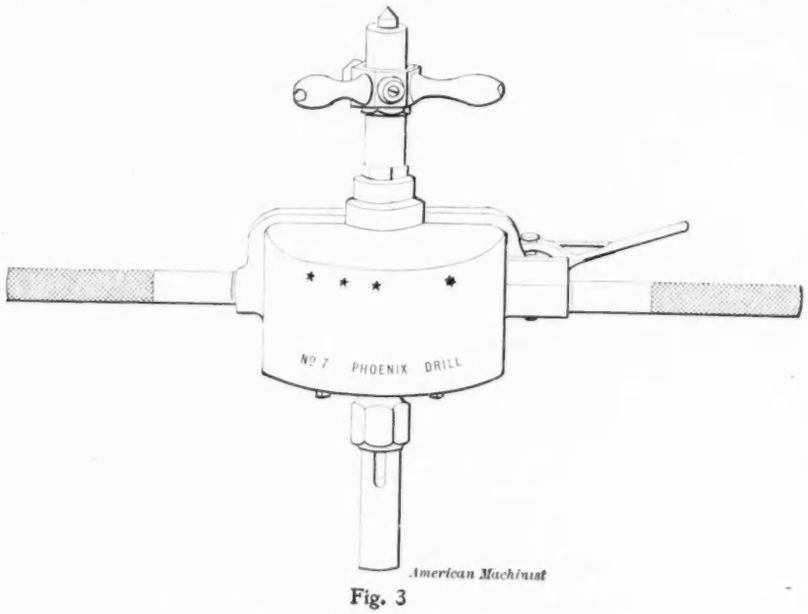

Fig. 3

DRILL WITH THREE OSCILLATING CYLINDERS.

A drill of quite different design is shown in Fig. 3. From its external appearance it might easily be taken to be of the rotary motor type, but it is not, as will be seen from Fig. 4. The large internal spur gear is attached to the case and does not revolve. The central spider is on the main drill spindle, and it carries, in fact, the entire operating mechanism, comprising three oscillating cylinders with double acting pistons, and three pinion shafts with cranks, to which the piston rods attach. The pinions mesh into the large gear. The air passes from the handle into the upper end of the spindle, and is distributed by the revolution of the spindle in combination with the oscillation of the cylinders. The exhaust is into the large central chamber and out through the other handle. The lower portion of the chamber contains oil and secures efficient lubrication of the whole. This drill is made in two sizes, designated as Nos. 7 and 8 Phœnix. The former weighs 36 pounds, and is used principally for tapping stay-bolt holes and for drilling up to 1¼ inch. No. 8 weighs 60 pounds, and is used for heavy drilling

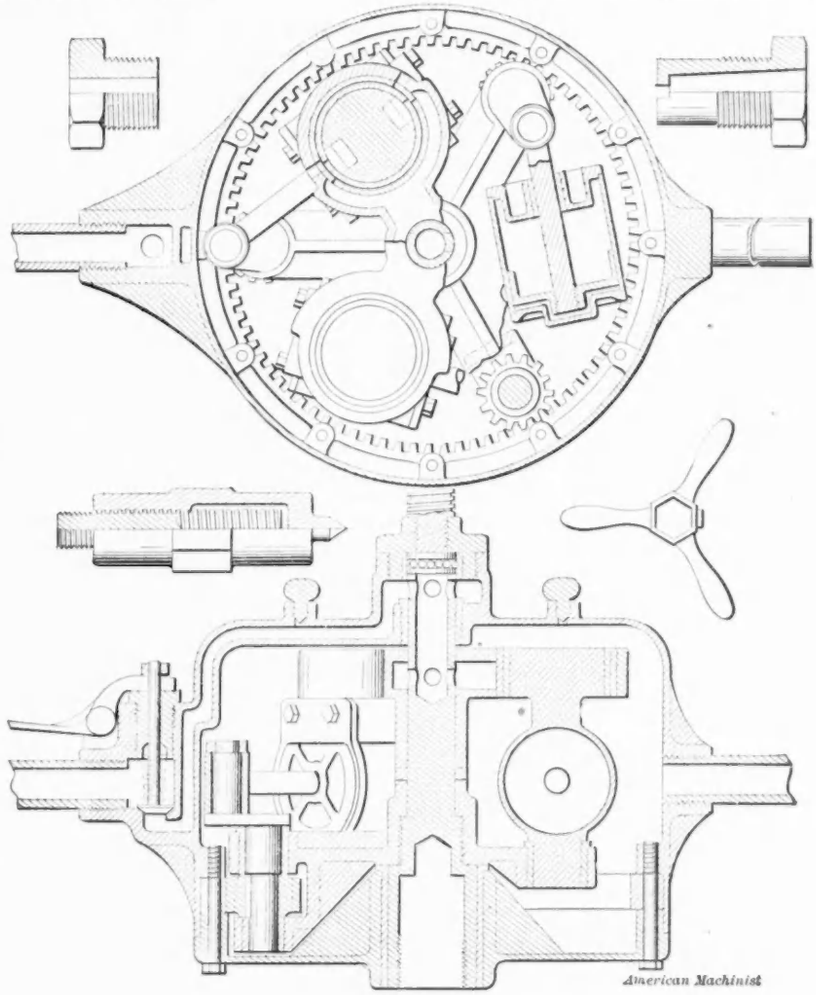

Fig. 4

DETAILS OF OSCILLATING CYLINDER MOTOR.

and reaming, the only necessary intimation as to its power being in the statement that with 80 pounds of air it has as much power as is safe for two workmen to handle. It is scarcely necessary to reiterate the presumption that either of these piston-operated drills gives better promise of air economy and of lasting qualities without repairs than the rotary motors. Both of the machines here described are made by the C. H. Haesler Co., Philadelphia.

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A Tapping Tool.

BY A. H. CLEAVES.

The tool for tapping illustrated in Fig. 1 is not a modern design by any means, but for a certain class of light work is very convenient, as well as favorable to the saving of taps. It is quite sensitive and the tapping of bottomed holes can be done with very small taps without the usual risk of breaking. *A* and *B* are two castings that complete the frame or stand. There is a straight across instead of a round shoulder where the two pieces come together. The hardened steel spindle *I* has a soft plug bored out to hold small taps soldered into taper plugs made of brass rod. *D* and *E* are the driving pulleys engaging with the piece *F* on the spindle *I* by means of the pins *O*, *P*, *Q*.

The pulley *D* runs right handed to enter the tap into the work and the pulley *E* left handed to run the tap out, by use of straight and crossed belts. *D* and *E* then run in opposite directions on the stationary studs *G* and *H*, which have set screws and binding nuts to hold them in position.

When a piece of work like a watch plate, for which these tools have been mostly used, is laid on the table *K* and held in place by thumb and fingers, the hole is tapped squarely in the plate, as it is pushed up against the tap.

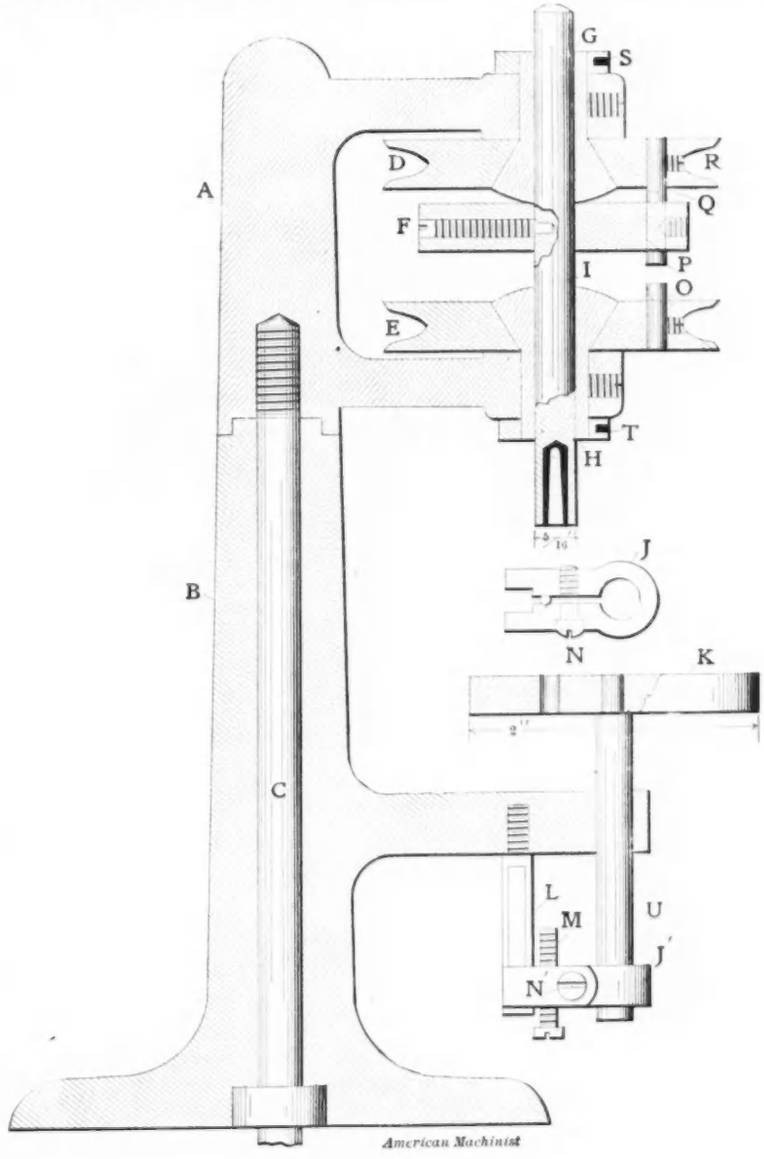

Fig. 1

A TAPPER FOR SMALL WORK.

The clamp *J* is an old style one, but practical for several purposes. It tightens the stop screw *M* with the screw *N*, which also makes the clamp itself fast on the spindle *U*. The guide pin *L*, upon which the clamp slides, is flattened on the sides. When the end of the screw *M*, after being set, strikes the bottom of casting *B*, the tap, as usual in similar devices, is drawn down into the work until the pin *P* is separated from the driving pin *Q* when *F* stops; then, the plate with the work being carried down, the lower end of the pin *P* engages with the pin *O*, which runs the tap out of the work.

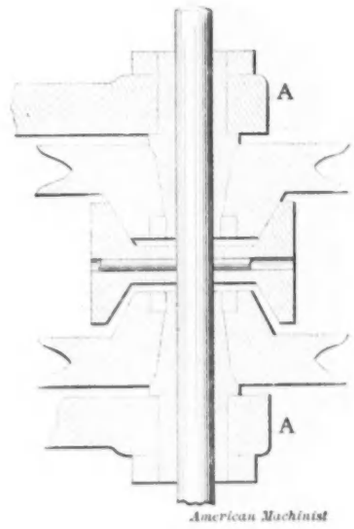

Fig. 2

REVERSING FRICTION CLUTCH.

The clamps like *J* were made in large lots; a strip with profile like that of *J* in the plan detail shown being planed up and sawed into widths, the rest of the work being made in a jig. These clamps are used on a great variety of spindles, as shown here.

Fig. 2 shows another style of driver that was used instead of the pins, being a set of friction clutches, and in this case the joint in the frame must be made between the arms or else the taper bearings must be held with cap pieces at *A A*, Fig. 2, to admit of assembling the parts. I think the friction driver was preferable for very small taps, while the use of pins shown in Fig. 1 may have been stronger. This tapping tool is all right for small electrical parts, etc., where thousands of a kind are carried through. Any kind of a holder or guide for the work can be secured to the table *K*.

Chicago, Ill.

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Foundrymen Sight-Seeing.

At the regular monthly meeting of the Western Foundrymen's Association, held in Chicago June 15, some of the members gave highly interesting accounts of what they saw when attending the meeting of

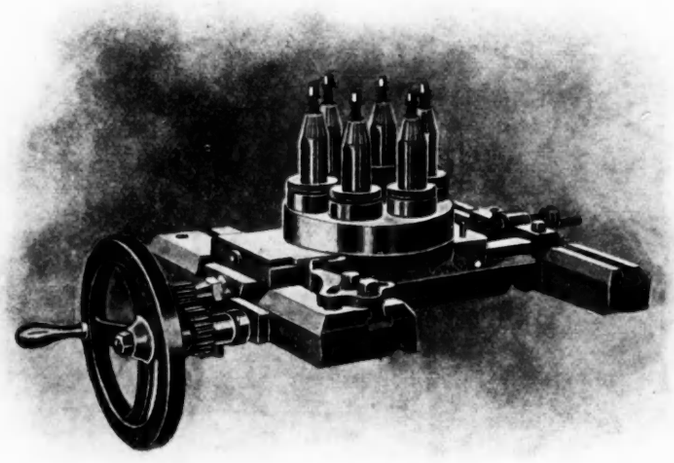
the American Foundrymen's Association at Cincinnati. The following, which is all for which space can be spared, is full of information.

Mr. Jones.—Mr. President: I was highly pleased with the trip from start to finish, I might say. One thing that impressed almost everyone in going there was the fact that while we were there Cincinnati was practically ours. The entertainment committee did their duty to the utmost. We were royally entertained. I was somewhat disappointed in not being able to take in some of the leading foundries in the city itself. I was told, however, that there was hardly a first-class foundry in Cincinnati; that all the shops were small and medium jobbing shops and that the large enterprises there did not have their foundries. Such concerns as the Lodge & Shipley people have their casting made outside in one of the dozen different shops, and the Bradford Milling Machine Company, which perhaps makes as many engine lathes as any one concern in this section of the country, have no foundry. I noticed while in front of their plant I should say in the neighborhood of 150 to 200 lathe beds in the rough. They were piled up promiscuously in the street in front of the works. I went to the Obermayer plant, which we had the pleasure of going through from one end to the other, and which to me was very interesting. I was also among the delegation which went to Hamilton and visited the Niles Tool Works. In their machine shop they are at the present time getting out two lathes for some of the gun makers, the beds of which are made in two sections and bolted together in the center. These lathes are to swing 9 feet from the ways and 60 feet between centers. I was curious enough to measure the brass bearing in the head stock, and found it to be 16 inches in diameter and 26½ inches in length. One point of interest to me was the construction of the largest mill they have yet made. It was to swing 25 feet. They were turning up the bed plate of it at the time I was there. I noticed a good share of it was made in cores. That piece weighed a little over 15 tons. We went from there and visited a foundry doing nothing but bench work, a part of which was a job of little buttons to be used by carriage manufacturers. We noticed two boys who were putting up 10,500 castings per day, in each one of which they set a nail. One boy did the molding, and the other set the nail and closed the flask. This same foundry was owned by the proprietors of the Hamilton Corliss Engine Company. We went over there and visited their foundry. I think I was more favorably impressed with it than I was with the Niles. It is newer, and thoroughly modern. They were getting out some of their heavy work. I noticed a 16 foot band wheel. I think the face was something like 40 or 48 inches. The character of the work was excellent. In my trip to the Addyston Pipe Works I was impressed with the rapidity with which they handled the work; it had never been my lot to have anything to do with a cupola of anything the size of the one they had there. I think it was lined up 8 feet and was 10 feet outside. They were melting 240 tons a day in that one cupola. They had five or six others, and all in a line, part in operation and the balance undergoing repairs. It was so hot in there that I could not remain long.

Mr. Thompson.—I brought some of these little buttons Mr. Jones mentions with me. It is quite interesting to see how cheaply and how quickly castings like that can be produced. In order to make this 10,500 in a day a boy would have to set one of these nails every three seconds constantly for eight and three-quarter hours. I tried to see how I would get on, and I could not do it. All the castings are milled in the morning, and in the afternoon they are packed in barrels and shipped off, so that the entire product is disposed of in twenty-four hours. Speaking of the Hamilton-Corliss Engine Works it also appeared to me that the management of that foundry was very good indeed. They were making cylinders and beds. All the facing is mixed under the supervision of the foreman.

The new sand is dried in the oven and put through a mill and then put through a machine-riddle, mixing it with the facing. In making the outside of their large band-wheels, while we adopt the dry sand core system, they make them in green sand, and while the inside of the mold is sticky dry the outside is not so; the face of the casting is very sandy. In some machine shops that would probably be objected to on account of the action of the sand on the cutting tool, making it necessary to have it sharpened or ground very frequently, but they seemed to think that there was no tendency toward dulling the tool. It is a matter of opinion as to whether it is economical to spend more time in the foundry in producing the smooth effect of the surface or putting in the extra time in the machine shop.

In the Niles Tool Works the foundry appeared to me to be a great deal larger than was necessary for use, and yet I believe they were sending castings outside to be made. There was a large amount of space occupied by unfinished castings, which seemed to have laid there several days, and that with the amount of space not used seemed to leave out one-fourth of the shop for actual use. Out here we would think the expense of a foundry having so much room and doing so little work would knock it out of the market in competition, but no doubt in a foundry of that size, where they are making such large castings, the castings have got to remain in the sand a considerable time, and this would leave a large amount of the space unoccupied.



TURRET FOR THE LATHE CARRIAGE.

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A Turret for the Lathe Carriage.

A turret adapted to be used on a lathe carriage is shown by the accompanying engravings, by which it will be seen that the turret is adapted to the use of the ordinary form of tool-post, six of these being held in a T-slot which extends entirely around the turret in its upper face.

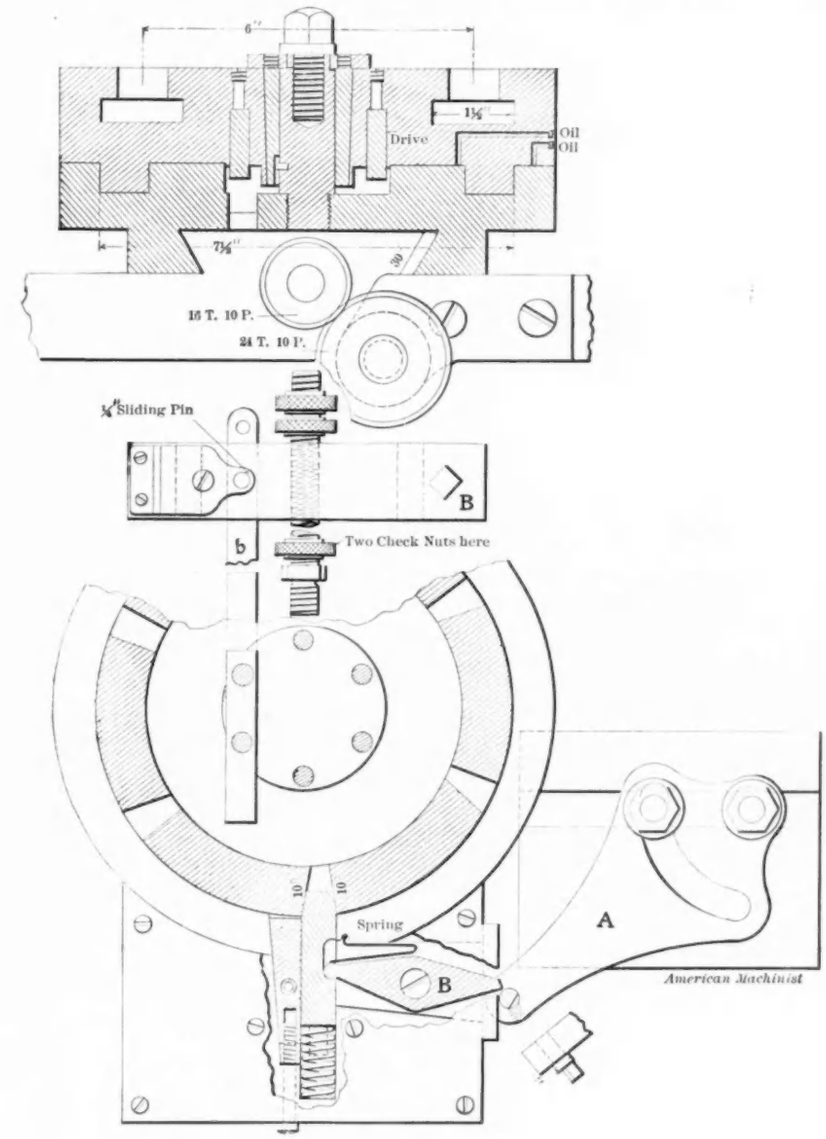
The turret is arranged to be released automatically, rotated and again locked by the action of moving the cross-slide, the movement required for this being

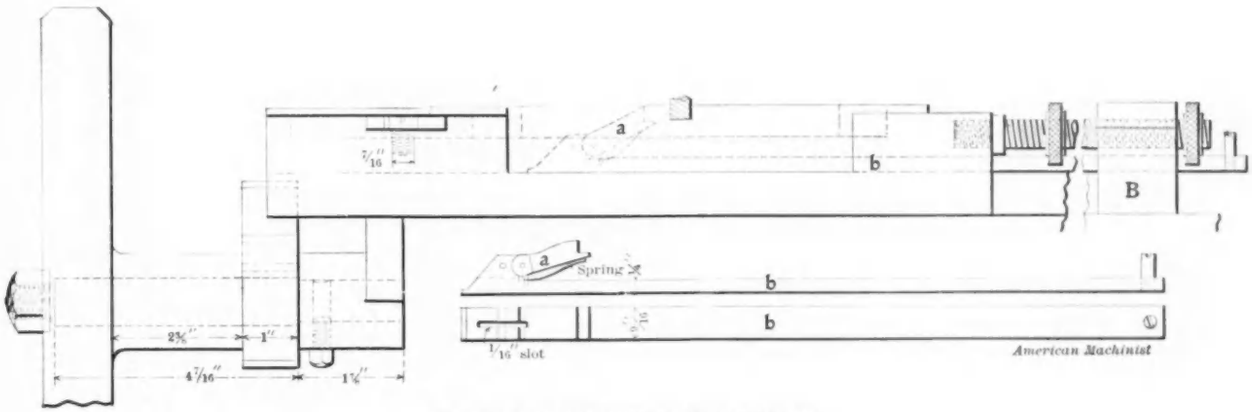
1½ inches. To quicken this movement a pinion replaces the ordinary crank-handle on the cross-feed screw, and a gear and hand wheel are applied, so that one turn of the latter moves the slide 1 inch.

In Fig. 2 *A* is an adjustable piece by which the locking bolt is withdrawn through the medium of the lever *B*, the slot formed in the side of the locking-bolt allowing the lever to pass the trip on the forward movement of the slide.

The turret is rotated by means of six steel pins, shown in Fig. 2, one of these engaging during the backward movement with the trigger *a*, Fig. 3, which is pivoted to the rod *b* and held up by a spring which allows it to be depressed by the pins as they move over it in the opposite direction. The rod *b* is also adjustable forward and back by the means shown in Fig. 2, so that the rotation of the turret may take place at any desired point of the travel of the cross-slide. The same piece (*B*) to which the rod *b* is locked by the pin as shown answers also as an adjustable stop for the cross-slide in both directions.

This turret attachment is made by Fay & Scott, of Dexter, Me., for their 16 inch and 18 inch lathes, and will be made for other sizes. It is intended to be put on in place of the ordinary tool block for work in which it can be used to advantage. The change from one to the other can be very readily made, and the only thing requiring to be done to the carriage in order to apply it is to drill and tap two holes by which to attach the bracket that holds the stud for gear and hand-wheel in front.





TURRET FOR THE LATHE CARRIAGE.

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The Evaporative Condenser.

Editor American Machinist:

Could you give me any information in regard to the evaporative condenser built on the principle that a pound of water evaporated will condense a pound of steam, using a condenser built of iron pipe or other suitable material and wetted on the outside with water at a temperature of from 65 degrees to 70 degrees, the condenser to be so proportioned as to evaporate the condensing water and thus avoid cooling the condensing water? A. H. McC.

By an opportune coincidence, on the same day on which the above communication was received there arrived also the latest issue of our esteemed contemporary, the "Mechanical Engineer," Manchester, containing an interesting article upon this precise topic, and we cannot do better than present an abstract of it, especially as this type of condenser does not seem to be very well known in this country. We abstract from the article of our contemporary as follows:

"The mechanical action of the evapo-

rative condenser, that is, the way in which the steam passes into and out of it, is the same as in an ordinary surface condenser, except that the steam fills the inside instead of surrounding the exterior surface of the tubes. The tubes are generally much larger and made of cast iron, though some makers use corrugated brass tubes or plain brass tubes wrapped spirally with wire. When made of cast iron the pipes are furnished with circumferential disks or radiators, to increase the exterior surface. The pipes are placed horizontally in vertical rows, so that the water which flows over them falls from a trough at the top, down from one pipe to the next, until it is caught in a trough under the pipes, and constantly pumped again to the top. The heat from the exhaust steam passes through the condenser pipes and evaporates some of the cooling water on their exterior surface. The one who possesses only sufficient knowledge to be dangerous immediately concludes that, as the vapor is at atmospheric pressure, it must also have a temperature of 212 degrees Fahr., but this is very wide of the mark.

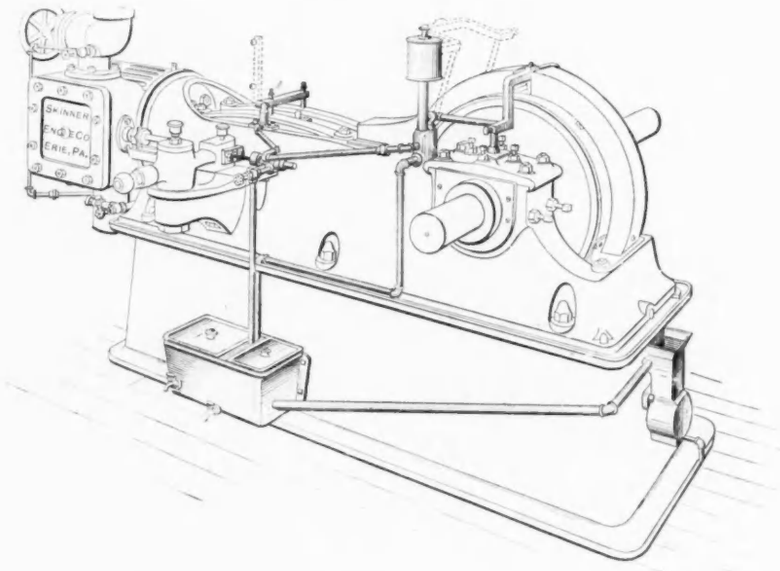
"Water at any definite temperature gives off vapor to the space above it of a definite pressure per square inch, whether there is a gaseous medium above it or not. For instance, let us have a vessel in which there is a perfect vacuum. Now, inject some water into it at a temperature, say, of 60 degrees Fahr., and a pressure gage would indicate a pressure above the water of .25 pound per square inch. If we admitted the atmosphere into the vessel by opening a cock the total pressure then registered by the gage would be that of the atmosphere, but one-quarter of a pound per square inch would be due to the water vapor. Again, if in the first case the temperature of the water had been 126 degrees Fahr. the gage would have registered 2 pounds per square inch, that being the pressure of steam corresponding to the temperature of 126 degrees.

"If the air were let in there would still be 2 pounds per square inch due to the water vapor, together with the difference between 2 pounds and the atmospheric pressure due to the atmosphere. It is as if the atmosphere had a voracious appetite for water vapor which must be satisfied according to the temperature of the atmosphere. The higher the temperature the greater the capacity of the air to take up vapor.

"This is the germ of the evaporative condenser. As fast as vapor forms on the outside surface of the condenser tubes it is carried away, either by wind or by reason of its density being less than that of the atmosphere; it will naturally rise from the condenser. Further, the heat radiated from the condenser will cause convection currents in the atmosphere, which will, in addition to the above, provide a stream of fresh air around the condenser tubes to carry away vapor and consequently heat. The higher the temperature of the atmosphere the greater its capacity to take up vapor, and hence this form of condenser works well in the middle of summer. These condensers are always placed as high up in the air as is convenient, for the purpose of making use of the wind currents. When this is not convenient or is impossible the condenser is surrounded with either a brick wall or a sheet iron or wooden substitute, and a fan supplies artificially the stream of fresh air.

"In the surface or jet condenser the cooling water is raised in temperature only a few degrees. In the evaporative condenser the heat goes into the cooling water as latent heat, and consequently 1 pound of cooling water will absorb about as much heat as 1 pound of steam gives up. To take an example, let 1 pound of steam be exhausted into a condenser at a terminal pressure of 8 pounds per square inch absolute. Its intrinsic energy is 1,068 thermal units, all of which go to the condenser, together with the work done upon the fag-end of the charge of steam by the low-pressure piston during its return stroke against the back pressure. Let the back pressure be 3 pounds per square inch. The volume occupied by 1 pound of steam at the terminal pressure of 8 pounds per square inch is 46.6 cubic feet; hence the work done by the piston in forcing a cylinderful into the condenser against a pressure of 3 pounds per square inch will be $3 \times 144 \times 46.6$ foot pounds, or 26 thermal units. The sum of these two quantities of heat is 1,088 units. From this sum we must deduct the heat left in the pound of condensed steam as it leaves the condenser. Assume the temperature of the condensed steam to be 120 degrees Fahr., then each pound will at that temperature contain 88 units of heat, measured from freezing point. Hence the heat given up by one pound of steam to the cooling water is 1,088 — 88, or 1,000 units, assuming the steam to be dry at release. Any wetness would assist the argument.

"Let the mean temperature of the atmosphere surrounding the condenser tubes be 60 degrees Fahr., and the cooling water to be supplied at 50 degrees Fahr. The total heat of evaporation of 1 pound of steam at 60 degrees Fahr. from water at 50 degrees is 1,090 thermal units. Hence it requires 1,000 ÷ 1,090, or .92 pound of cooling water per pound of steam under the above circumstances. Allowing for waste and leakage it is fair to assume that what the makers state is quite true—namely, that no more water is required with an evaporative condenser than without one.



American Machinist

A COMPLETE OIL CIRCULATING SYSTEM.

A Complete Oil Circulating and Purifying System.

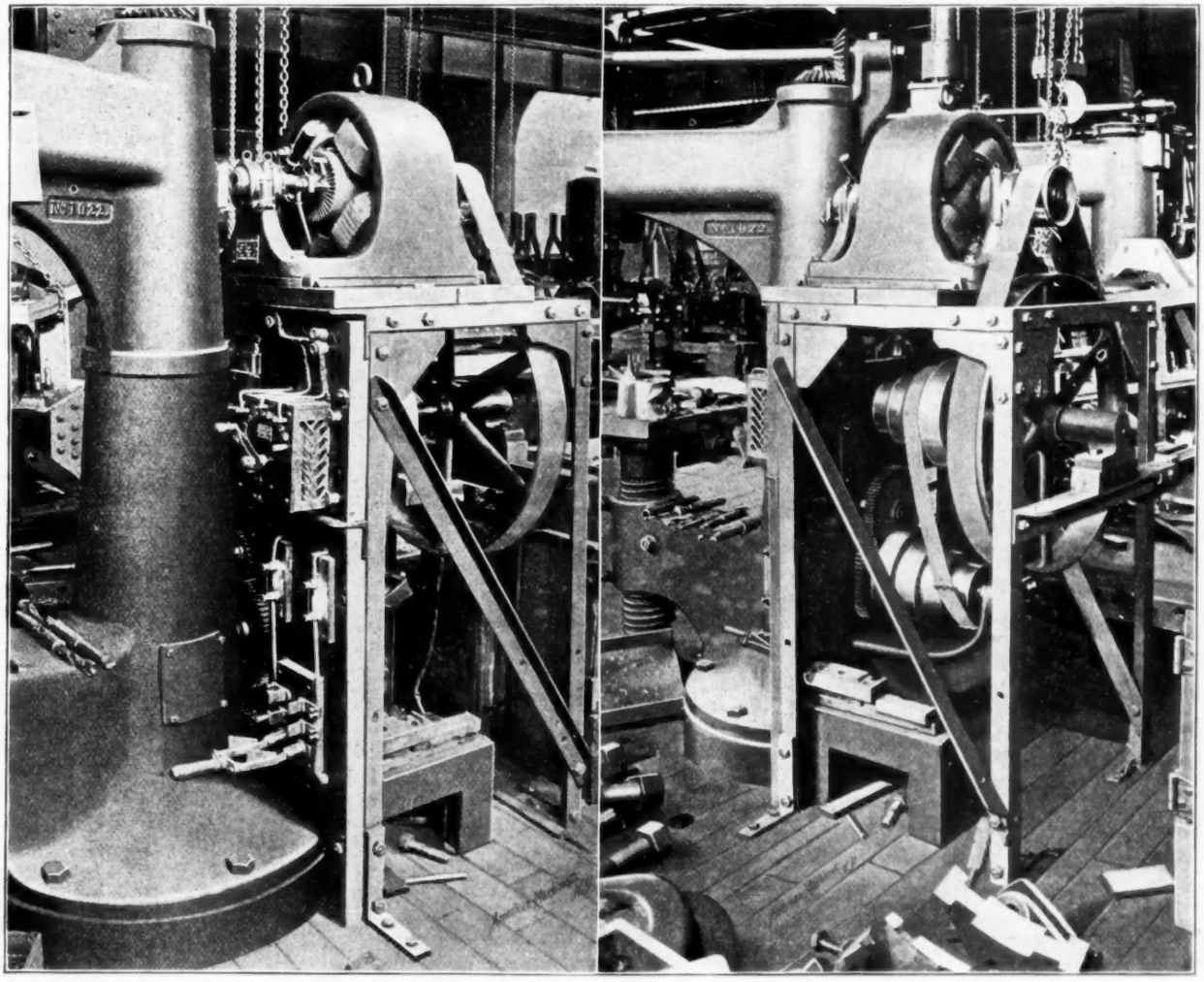
Oil is getting to be more and more recognized as an actual and necessary part of every running steam engine, and engine builders seem to be vying with each other in providing means for the constant circulation and renewal of the oil required. Perhaps the most complete, entirely automatic and independent system for oil circulation and continued purification and return is that applied to the Skinner engine, made by the Skinner Engine Company, Erie, Pa. This system as applied to one of the engines of this company is shown in the accompanying cut. It is claimed for this arrangement that it supplies a constant feed of pure oil to every bearing of the engine, always in full view of the engineer; that it auto-

matically separates the water from the oil and also purifies the oil from all abrasive particles and dirt and keeps up the circulation for any length of time without attention or readjustment. Circulation of oil without reliable means of purification is evidently bad practice, as it is only a reproduction of a standard operation of the shop for working machinery to a fit.

The cut shows the essential features of the arrangement, with little call for explanation. A single supply tube system extends to all points to be oiled. The oil one. It is claimed that perfect separation of the oil and the water is here effected without waste of oil. The oil purifier is shown on the side of the base. Neither strainer nor filtering material is used, yet it is claimed that the oil is perfectly purified. It is claimed that with this system a 50 horse-power engine may be run ten hours per day for one year with the addition of but 5 gallons of new oil. With a constant stream of oil to every bearing not one drop will reach the exterior of the engine, the foundation or the engine room floor.

from time to time in regard to the electric installation at the Baldwin Works have shown that in most cases where individual motors have been adopted it has been with a view to avoiding the obstruction of an overhead traveling crane. This makes it necessary in many cases to support the motor from the floor and not from the ceiling or roof posts.

The machine here shown is a radial drill press and the method of mounting followed will be seen to place the motor on a light angle iron frame, which is



FRAME FOR CARRYING ELECTRIC MOTORS.

feeders at each point are hinged so that they may be swung back out of the way, as shown by the dotted lines. Regulating screws in each feeder can be adjusted for the feed required, and no further attention is called for. The elevated oil reservoir guarantees a constant pressure and flow. The pump, driven by the valve slide, is in capacity larger than the requirement, and the surplus flows back from the elevated reservoir to the subbase below the engine. The oil and water separator is shown at the end of the engine, the oil passing out at the upper pipe and the water through the lower

Mounting for Electric Motors.

The extensive employment of individual motors at the Baldwin Locomotive Works has made it necessary to find some satisfactory means of mounting them, and while of course no one plan will apply to all situations, the one shown in the accompanying half-tones is found to be sufficiently flexible to apply to a great many cases, and a large number of machines are to be seen in these works to which motors have been applied in substantially the manner here shown.

The articles which we have published

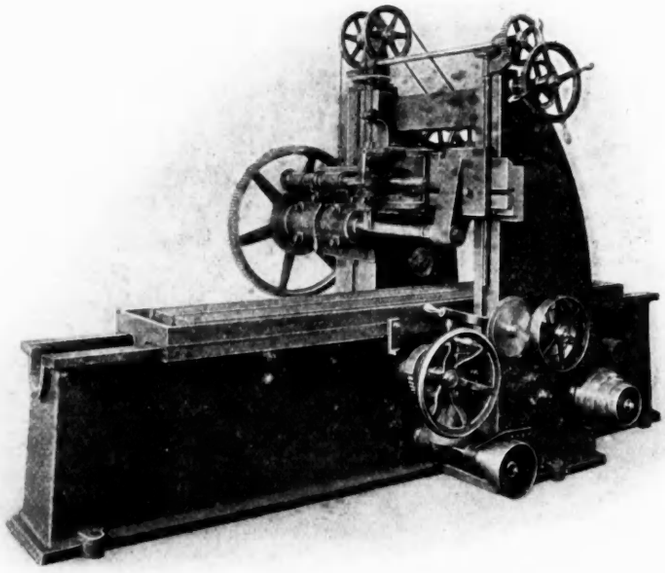
bolted to the floor and placed alongside the machine to be driven. The former overhead countershaft is taken down, shortened, divested of its old tight and loose pulleys and mounted within the frame, a single large tight pulley providing for connection to the motor and for reduction of the speed.

Many mechanics will be disposed to criticise the arrangement because of the use of very short belts. We have long considered the objection to short belts to be mostly a bugbear, and in point of fact in the great number in use at the Baldwin Works they are not found to be

objectionable. It should be remembered that if a short belt is short-lived its cost is also small. We can afford to replace a belt 10 feet long twice as often as one 20 feet long. It occurs to us, however, that inasmuch as the motor belt is here vertical and the advantage of the usual tightening screws is therefore lost, it might be worth while to place a good arrangement of wedges with suitable screws below the motor, so that by slightly raising it the belt could be tightened and the stretch be taken up.

The pictures have little to add by way of description. A plank on the side of the frame nearest the operator will be seen to carry the switch and starting box and so provide for convenient manipulation, while the whole is under the operator's eye, where it can be easily oiled and otherwise attended to.

The second spindle will be seen to be driven from the main spindle through spur and spiral gearing, which increases the speed of the second cutter to agree with its reduced diameter, without shifting the cone belts. The drive of this spindle is also fitted with a clutch, by which it may be thrown out of action and the machine may obviously be used for any other class of work to which it is adapted. An independent quick return for the table is provided, by which it is returned, if need be, while the machine as a whole is at rest, through the pulley, friction gear and hand lever seen on the front side of the bed.



DOUBLE SPINDLE KEY SEAT MILLING MACHINE.

Special Key Seat Milling Machine.

The accompanying half-tone illustrates a new feature in keyseat milling machines. The machine shown was recently supplied to the General Electric Company by the Newton Machine Tool Works, and is intended for milling keyseats in armature shafts. In this work the keyseat is sunk in the center of the shaft, and the purpose of the new feature is to clean up the ends of the seat without drilling or hand chipping. The keyseat is first cut in the usual way by a cutter mounted on the main or horizontal arbor, the head being lowered until the cutter cuts to the proper depth, and the lengthwise cut being made by feeding the table in the usual way. When this operation is finished the bottom of the keyseat is of course curved at the ends, and to clean this out an end mill is inserted in the supplementary vertical spindle, the diameter of this mill being the width of the seat. This second cut finishes the work to uniform depth throughout, but leaving curved ends in plan, of a radius equal to that of the second cutter.

The machine here shown has a capacity to mill 30 inches wide, while the center of the main spindle may be raised 30 inches above the table, but the attachment shown is applied to other sizes of machines in addition to this one.

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A New Cone Pulley Diagram.

We have been much interested in examining a new solution of the cone pulley problem*—a problem whose apparent simplicity and real complexity offer perhaps as great a contrast as is to be found in mechanism.

Professor Palmer's pamphlet is too voluminous for extended abstract here, but by his permission we reproduce his final diagram for open belts, together with his description of its application. The pamphlet opens with a statement of the desirable properties which a satisfactory diagram for this purpose should possess, and follows this with an examination of the leading solutions of the problem which have been offered. As a result of this examination all known solutions are found to be faulty in one or more respects. Among the solutions thus examined is that of Reuleaux, of which Professor Klein's modification was published in our issue for October 29, 1896. While this diagram is found to be remarkably complete, certain objections to it from the draftsman's point of view are pointed out, among them being the fact that it involves curves which must be laid out by ordinates and then be drawn by sweeps. Professor Palmer has discovered that by a simple transformation the complex curves of the Reuleaux diagram are so changed in character as to be quite exactly represented by circles, and that, moreover, the diagram when so changed possesses properties which the original lacks, the resulting diagram being not only easily and quickly drawn with the usual instruments, but at the same time accomplishing results which are impossible with the original. The chief property of the new diagram which the Reuleaux construction, and we believe all others, lack, is that by which the cone steps necessary to give predetermined velocity ratios are obtained directly by construction. Professor Sweet's diagram and its modification by Mr. Smith have this deficiency in common with the Reuleaux diagram, thought it has the same advantage as the present construction in requiring only compass and straight edge for its construction. Previous diagrams give all possible diameters which will run together, but to obtain those steps which will give the desired velocities repeated trial is necessary, the desired results being obtained by a process of approximation. With this diagram certain lines are laid down to represent the desired velocities, and from these the necessary diameters are found directly by construction. The diagram thus appears to be the most complete solution of the problem in all its phases that has been offered. A natural objection to it is its large size in cases where the cones are far apart, but it will be seen that the largest dimension is due to the construction for finding the length of the belt. Usually there is no occasion for finding this length by construction, and if this feature of the diagram is omitted, its extreme dimension becomes the distance between centers, which dimension appears in all diagrams for the same purpose, and, indeed, seems inherent in any graphical solution of the problem.

The pamphlet gives a very full discussion of the cone pulley problem and a demonstration of the properties of the di-

*"The Designing of Cone Pulleys with Concise Practical Rules." By Walter H. Palmer. Thirty-five 6x9 inch pages with twelve illustrations. Price 50 cents.

agram, with a concise statement of the steps to be taken in its application to both open and crossed belts. The accompanying illustration shows the diagram as applied to open belts, and the following text is extracted from the pamphlet and shows how the diagram is to be used for such belts. We have not reproduced the diagram as modified for crossed belts because of the comparatively infrequent use of such belts on cone pulleys and because of the greater simplicity of the problem as applied to them:

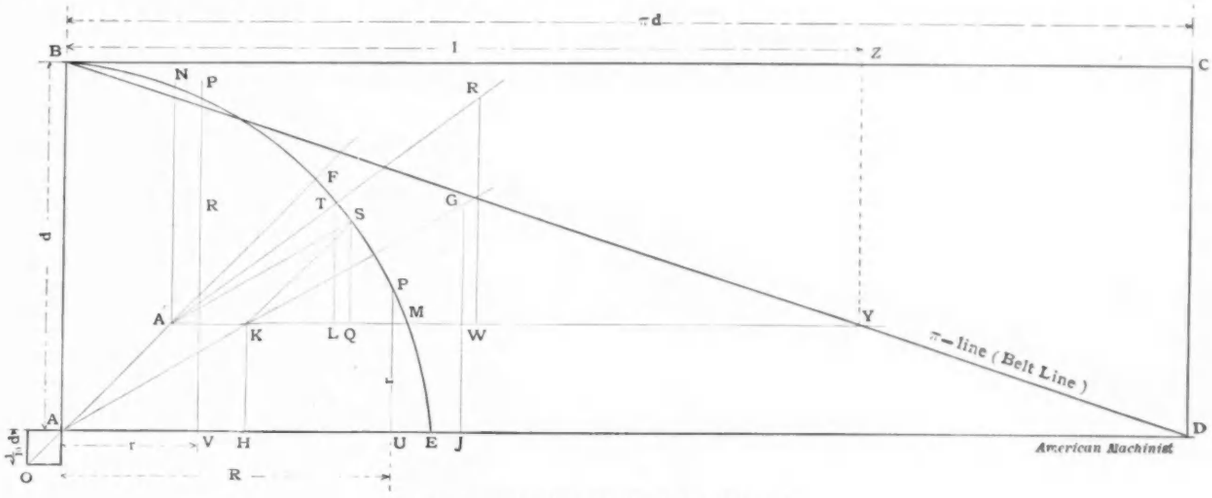
Let R be the radius of one step of the cone on the driving shaft;

and r the radius of the corresponding step on the driven shaft.

Let N be the number of revolutions the driving shaft makes;

and n the number which the driven shaft is to make when the belt is on this pair of steps.

Then let R_1 R_2 R_3, etc.,
r_1 r_2 r_3, etc.,
n_1 n_2 n_3, etc., be corresponding values for the successive steps, N being constant.



PALMER'S CONE PULLEY DIAGRAM.

Let l be the half length of belt required;

and d the distance between centers, all being in the same units and drawn to the same scale.

To design a pair of cones for an open belt draw first the rectangle $A\ B\ C\ D$ shown in the figure, making $A\ B = d$ the distance between centers of the shafts, using any scale most convenient. Make $B\ C = \pi\ d$, that is 3.1416 times the distance between centers. Then draw the "belt line" $B\ D$. Now draw the 45° line $F\ A$ produced through O. Lay out the small square $A\ O$ shown, making the side of this square just 1-10 of $A\ B$, the distance between centers. Then set the center of the compass at O and with radius $O\ B$ strike the arc $B\ F\ E$, and the diagram is ready to use.

When the speed of the driving shaft is given, and the speeds to be produced on the driven shaft are already determined by conditions of the design, and circumstances are such that cone pulleys of unequal size must be used, proceed as follows:

From the nature of the design of the machine on which the cones are to be used determine what values are best to choose for the first pair of radii. If there are obstructions which the belt must pass, or the room for the cones is limited, this may require several trials. To do this draw a line from A, as $A\ K$, inclined so that any vertical to it as $G\ J$ will be to its horizontal $A\ J$, as

$$\frac{N}{n}$$

That is, make $A\ J = n$, and $G\ J = N$ to any convenient scale. Then choose a size for R (or r may be chosen first) and lay it off from A to H with the scale used for $A\ B$. Then $H\ K$ is the proper value for the other radius r, for this R, chosen. See if this meets the requirements of the machine. If not lay off another value for R and draw the vertical to the straight line for r. After a few trials a pair of radii will be found which will be of a suitable size for the requirements of the machine, and which will allow the belt to pass the obstructions, unless the design has in some way made this impossible.

This pair once found, the other radii all depend upon them. Suppose $A\ H$ and $H\ K$ to represent the pair R and r, found as just explained. Through K draw a 45° line $K\ S$ parallel to $A\ F$, and $S\ A'$ parallel to $A\ K$, finding A'. Now A' remains *fixed* for this particular pair of cones. Through A' draw a horizontal and produce it to its intersection with $B\ D$, when we have at once l, the half length of belt required for these cones, as shown.

Now having fixed A', the portion of the curve between N and M gives all the possible pairs of radii for steps which this length of belt will fit, horizontal measurements being the R's, and verticals the r's; and it only remains to pick out from all these possible pairs of radii those having the proper ratio to give the desired speeds.

This is quickly done thus: Take the next speed n_2, and N the revolutions of the driving shaft. Lay off n_2 from A' to W, and N up from W to R, using any convenient scale. Draw $A'\ R$ and we have at once $A'\ L$ for R_2 and $L\ T$ for r_2 in the same scale as d and l, and the other radii. And so for each speed a pair of radii with which to draw the required pair of steps can be had at once from the curve $B\ E$.

Usually the speeds will have to be arranged to form a geometrical progression. Generally the end speeds will be given or determined upon independently, and the intermediate ones have to be adjusted to form this series. In this event if we are to have, say, five steps on the cones we have given

N, n and n_5.

And we know that the five speeds will be:

n, na, na^2, na^3, na^4 $(= n_5)$,

if the series is to be a geometrical progression, a being some multiplier. Then

$$a^4 = \frac{n_5}{n}$$

and by use of a table of roots, a can be found, and then each of the five speeds to the nearest convenient fraction of a revolution.

Now these values can be used as before and the radii quickly found.

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Valves and Valve Seats for Heavy Water Pressure.

The accompanying illustrations are from sketches kindly furnished us by Mr. Huntzberger, master mechanic of the Pencoyd Iron Works, and show the construction of valves and valve seats used in their hydraulic pressure service, the pressure employed being 500 pounds per square inch. The modification from usual

practice consists in the insertion of a ring of leather, which is sometimes placed in the seat and sometimes in the valve.

It will be seen that a groove about ⅛ inch square, but slightly dovetailed at the bottom, is cut in the face, in which is inserted the ring of leather, this ring, as inserted, standing slightly above the surrounding surface, but of course soon becoming flattened under the pressure, until this projection above the surface is scarcely appreciable. Fig. 1 shows the construction as applied to the seat, while Fig. 2 shows it applied to a valve.

According to Mr. Huntzberger this construction is the source of much comfort. Formerly, with metallic valves and seats, it was a regular thing to have a force of men at work on Sunday grinding in leaky valves, but now, with valves fitted in this way, trouble with leaky valves is a rare occurrence. The construction shown is in regular use throughout the very extensive Pencoyd Iron Works.

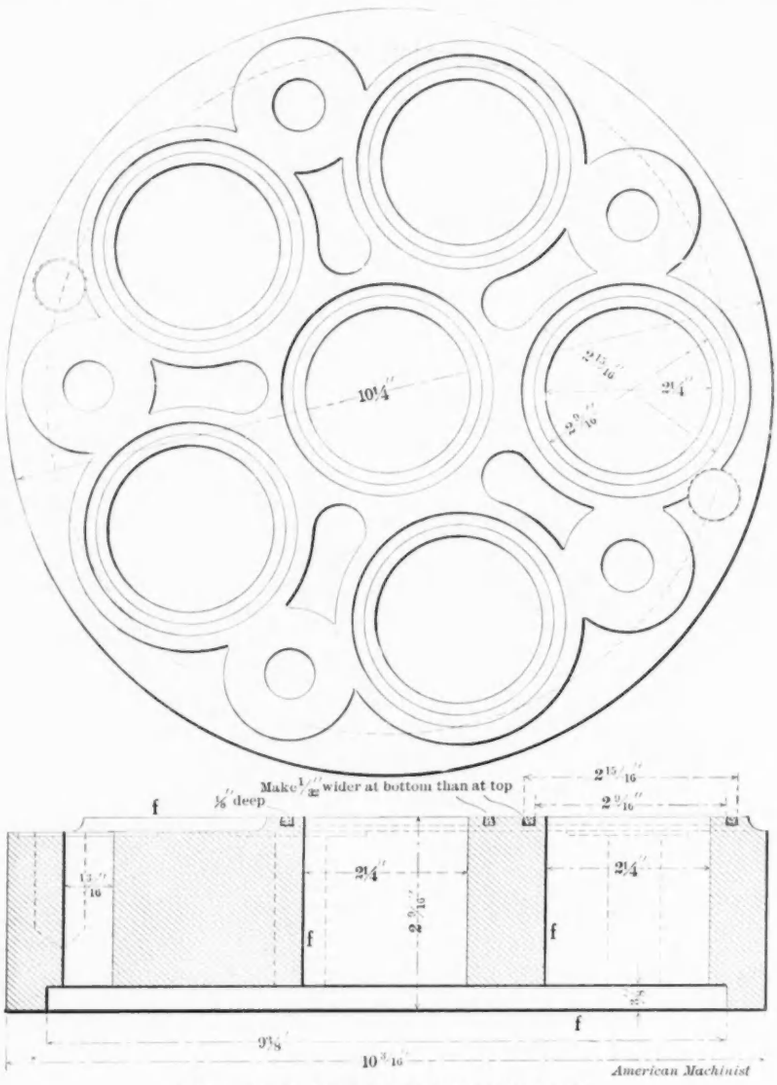

FIG. 1.—LEATHER RINGS IN VALVE SEAT.

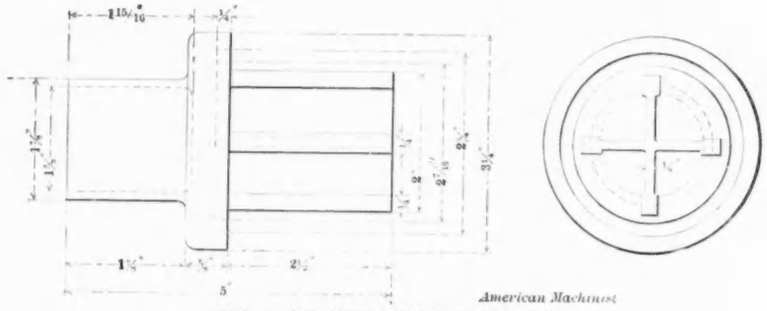

FIG. 2.—LEATHER RING IN VALVE.

Letters from Practical Men.

English and American Slide Rests—American Tools in England.

Editor American Machinist:

I think Mr. Hart is in error in your issue of June 2 when he says: "Now, Professor Sweet seems to me to overlook the good points of the four-bolt tool post." On page 166, 1895, "American Machinist," Mr. Sweet says: "The English slide rest is an institution and made to be used a certain way." This is the way explained by Mr. Hart, and is still adhered to here, and I know of none better. In some cases, however, two T slots, large enough to carry the usual American style tool holder, are on the top of the slide rest and then an American style tool holder can be used and the tool can be got closer to the work than the same tool holder will allow on an American lathe as a rule. When the slide rest is required to be used English fashion then four bolts with corresponding T heads are used, along with the "straps" or "clip" mentioned by Mr. Hart. Professor Sweet further says: "The English slide rest is immensely superior to ours;" also in personal conversation with me he has shown himself fully appreciative of its good points. Regarding the shape of the tailstock interfering with the working of the slide rest handle, I note that Flather, Hendey-Norton, American Tool Company, etc., have hollowed out the front of tailstock to allow the use of handle. In my opinion the lathes look much more shapely in consequence, and I would like to know whether the above makers have found any objection raised to the alteration by American users. It must not be thought by Americans that their style of tool post is peculiar to them, as many lathes have always been made here with practically the same style holder. They are principally to be found in cotton machinery shops, and I have worked on lathes in such shops twenty years ago which had to all intents and purposes the handy features in almost every particular found in the best American lathes. "Mass" production is understood in such shops to a greater extent than they are generally given credit for. A representative of the Cleveland Machine Screw Company, who was in charge of their exhibit with Messrs. Churchill & Co. at the Stanly show a couple of years back, told me he was astonished at what he saw in some of the Oldham textile shops, and he thought it would be hard to beat the amount and quality of their production. Regarding the recent introduction of American tools here I do not find any real jealousy of them on the part of most tool makers here. They fully admit their superiority in some points, but are able to point out equally good things in their own pro-

ductions. In fact, I know some of them point out the differences in the two styles by means of American tools in their own shops, and no maker of repute here has any need to be afraid of having to take a back seat. In fact, the importation of American tools has been a good thing all around, as it has caused, and will continue to cause, discussion on the principles of tool making and tends to improve the design of tools on both sides the Atlantic. As I have said before, I am personally in favor of using both English and American tools, as the best tool for any purpose can generally be selected from either one source or the other.

JAMES VOSE.

Manchester, England.

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Original Index Wheels—Scraped Surfaces.

Editor American Machinist:

There is no class of work in which the genuine mechanic is more interested than in those by which superior results as regards accuracy are obtained by "originating" methods, and especially those in which these methods seem to be the only ones by which a high grade of work can be obtained. From the scraping of a surface plate to the production of a perfect screw these methods show the mechanic at his best, and in fact as processes they are the work of some of the ablest mechanics that have ever lived. There is no more interesting reading for the mechanic of to-day than the paper by Sir Joseph Whitworth, in which he described the then new process of scraping, and in the reading of which he exhibited the first set of surface plates ever made. Scraping is such a common operation to-day that we sometimes forget that it was ever new and looked upon as a great invention—which indeed it was. And yet as a process of everyday commercial work it is comparatively recent, and there could be no better single illustration of the advance in the quality of workmanship during the last generation than the increased use of this process. I believe it is a fact that this process was introduced in the shops of the Brown & Sharpe Manufacturing Company less than twenty years ago, and the writer himself was once within that time in negotiation with another leading builder of milling machines for the purpose of introducing the process in his works. Personally, when I hear the expressions of contempt for scraping and the scraper that are often made, I feel like telling the scoffer plainly that he is no mechanic. For myself I know that it was the scraper which gave me my first conceptions of the meaning of real accuracy as well as of origination.

The purpose of this letter is, however, to criticise the details of the Thorn index wheel described by Mr. Randol in your issue for June 9. While the main idea of the plate seems to be beyond criticism, and in fact to be a particularly meritorious solution of the problem, the method of holding the disks to the main plate seems to be very faulty to say the least. With the screw heads bottoming directly on the disks and the disks subject to the friction of the heads while they are being tightened, it would seem as though direct encouragement was offered to the disks to shift their positions and lead to decided doubt as to their positions being accurate in the end. This would be intensified by the practical impossibility of tapping the holes square with the plate, leading to binding of the disks by the screws on one side initially, with springing of the screws and shifting of the disks as the screws are tightened. It seems to me that the plan shown in Figs. 1 and 2 would overcome these objections and better insure that the disks do not shift their positions when the nuts are tightened, as it will be seen that no torsional or shifting efforts are put on the disks. The disks are partly covered up, but seem to be exposed enough for use. Fig. 3 shows another plan which is much neater in appearance than the one shown in Figs. 1 and 2, and while not so perfect in the action of binding the disks it would probably give practically as good results. Of course the bolt should be a good sliding fit in the hole in the main plate, to avoid bending action when tightening the nut. The bolt might be jointed and have a snug inserted in the main plate to prevent turning, with good effect. With such an arrangement the plan of Fig. 3 would be as about as free from disturbing strains as Figs. 1 and 2.

C. O. GRIFFIN.

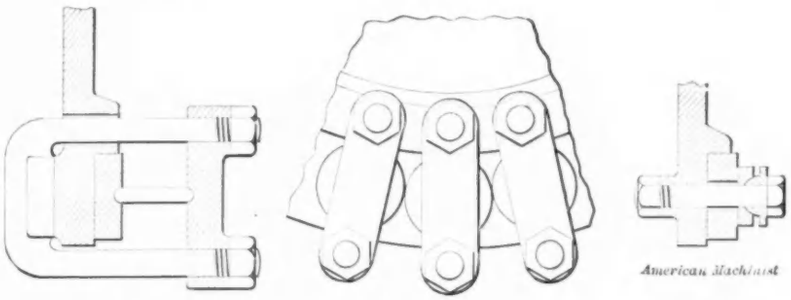


Fig. 1 Fig. 2 Fig. 3

SUGGESTED IMPROVEMENTS IN THE THORN ORIGINAL INDEX WHEEL.

▲ ▲ ▲

Amateurs and the Dictionary.

Editor American Machinist:

It has come to my knowledge that one or two of the respected readers of the "American Machinist" are afraid that I have insulted the dictionary by my recent use of the word amateur. Now, I am quite well aware that the word amateur has a very clearly defined signification, and that it fits very neatly an idea which it is often necessary to express. I am aware also that the present use of the word, although universally adopted, is a perversion of its original etymology. When in the course of events I have occasion to express the idea for which the word amateur originally stood why may I not use the word for that precise idea, when I at the same time take pains to have it understood that I so mean? In speaking of "Amateurs in the Shop" that is precisely what I did, only that and nothing more.

If the "American Machinist" was the "American Horticulturist," and if I, as a contributor to it, should find it in my way to write something about green blackberries, I can imagine that I might find myself in just such a pickle as I am in now through my well intended remarks about shop amateurs. It is a well-known fact that blackberries are red when they are green, so that when a green blackberry is spoken of a red blackberry is meant, and it is quite possible that the compiler of some pomological dictionary, or some self-constituted guardian of the linguistic proprieties, might arise and insist that, in the case of blackberries, as green means red so generally, it must and shall mean red always, and no one shall have any right to say green blackberries or to write green blackberries unless he means red blackberries. Now, it might happen that I would actually want to speak of genuinely green blackberries—blackberries of the color of grass, or of the Irish flag—what in such a case should a poor fellow do? If I must not say green when I mean green what must I say?

That is precisely the fix that I am in about the word amateur. If I may not say amateur when I mean amateur what must I say, so as to be understood? Before I was ten years old I was cruelly and brutally compelled to learn to conjugate the verb *amo*, and the little knowledge so acquired has proved a dangerous thing, generally to myself, but sometimes to my neighbors. Of course I learned, therefore, that an amateur is first of all a lover, and so, naturally, when I wanted to speak of a man in the shop whose

most pronounced characteristic then under consideration was his love for his work, with all that the love would imply of interest, and constantly dwelling thought, and penetrating understanding, and successful association, I spoke of him as a lover, or an amateur. I meant green and I said green, and at the same time I called attention to the fact that I did not mean red, and I do not really believe that it was absolutely necessary to misunderstand me.

I need not reiterate my belief in the shop amateur as I know him. The best work and the most work is done by him, and especially is it his function to discover and open up the newer and more advanced and prolific mechanical practice. It is nothing short of gross injustice that there is no word by which it is permissible to designate him.

TECUMSEH SWIFT.

▲ ▲ ▲

Wide Tires and Good Roads.

Editor American Machinist:

While not exactly in your "line," I must express my feeling of pleasure in reading the editorial in your issue for June 30 on wide tires for road wagons, and at the same time describe an object lesson on the value of wide tires which exists at the stone quarry of the Solvay Process Company at Syracuse, N. Y. This quarry lies at some distance—half a mile or so, I should say—from the main road or highway, and the branch road from the highway to the quarry is maintained by the Solvay Company. Over this road an immense amount of stone is transported in heavy wagons. The road is of that kind and is put to a use which would ordinarily make it a road only in name. I should expect it to be as full of ruts as a skimmer of holes and to see the horses tugging and straining to get their loads over it. In point of fact, however, nothing of the kind is to be seen, for the reason that the Solvay people have fitted wide tires to all their wagons. I was told that but very little work was put on the road, but nevertheless, while not a macadam or made road of any kind, it is always in excellent condition. Its average traffic is much heavier than that of the highway, but it is uniformly in about a thousand per cent. better condition than the highway. It is, in fact, a pleasure to watch the effect of a wagon load of stone in passing over this road. The wide tires act like road rollers; they do not cut into the surface at all, but instead constantly improve it—a tendency which is increased by the fact that the usual stupid arrangement of wheels is not followed, but the forward wheels are made to "track" narrower than the rear ones, so that with, say, 6-inch tires, 2 solid feet of rolling is done for every load that passes.

I believe that we will never see good roads in this country—that is, good roads as the customary thing and not as an occasional exception, maintained at excessive cost—until the American people get enough sense into their heads to adopt wide tires, and the Solvay road shows that wide tires alone would go far to solve the whole problem of good roads.

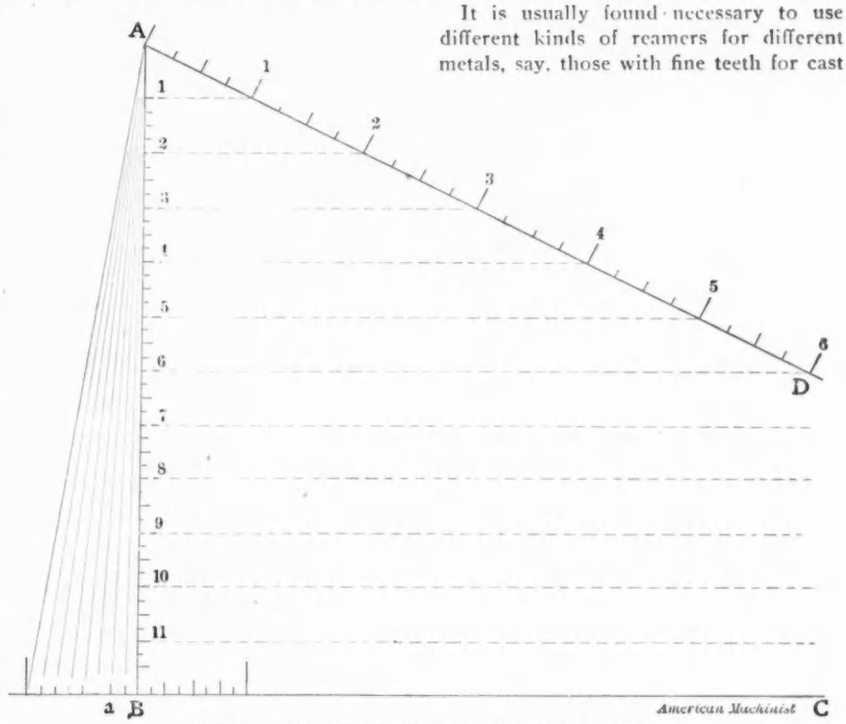
H. D. AVERY.

▲ ▲ ▲

A Shrinkage Scale for Pattern Makers.

Editor American Machinist:

Patterns have to be made with different shrinkages for different materials, and we do not have shrink rules for every case; so sometimes we have to do a little arithmetic, mental or otherwise, to find just the proper amount to allow in the different dimensions that the work calls for. I inclose a diagram which I have found to work well for a shrinkage of 5-32 inch to the foot. The vertical line *A B*, of any convenient length, is divided into twelve equal parts. *B C* is drawn a foot long, and then an oblique line from *A* to the end of the line *B C*.



SHRINKAGE SCALE FOR PATTERN MAKERS.

Part of these lines are cut off in the diagram. The amount of shrinkage to be allowed to the foot is measured off to the left of *B*, and a line, as *a A*, is drawn. Then on any horizontal line the distance from the line *A B* to the line *A D*, or the line *A D C*, if completed, will represent the nominal measure and the distance from the line *a A* to *A B* will be the addition for shrinkage. With a complete and full sized diagram the measures may be readily taken off with dividers. If the draftsman could be made to think so it would be a good plan to make such a scale for the pattern maker's use on the drawing.

WM. NEWTON.

Oneonta, N. Y.

[Diagrams for shrinkage have of course been made often enough, and are sufficiently familiar to the expert draftsman, but are perhaps not in as common use with all pattern makers as could be desired. We have re-drawn and added to the diagram sent by our correspondent, thinking it may be of service in the shop. It shows how a diagram may be made for any range of shrinkages. Lines may of course be drawn also to the right of *A B*, in which case the measures would be proportionally shorter than nominal instead of longer, minute changes in that direction being sometimes required. Instead of the draftsmen making, as suggested, a diagram upon the individual drawing, such a diagram as this might be made for permanent use in the pattern shop.—ED.]

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A Reamer Wrinkle.

Editor American Machinist:

It is usually found necessary to use different kinds of reamers for different metals, say, those with fine teeth for cast iron, coarse for brass, etc. A new kind which is being used in Germany is as shown in the figure—the cutting edges are milled back to a rib running parallel thereto, and are cleared by grinding. The guiding strips or "lands" are ground hollow to act partly as guides and partly as finishing edges. To prevent chattering the division of the circumference into cutting and grinding portions is irregular, so that no tooth can possibly strike in where the preceding one cut. It is claimed that the work produced by these is more perfect and the power

required less than with other reamers. The principle is easily tested.

ROBERT GRIMSHAW.

Dresden, Germany.

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Inquiries for Machinery.

Those who make, or may know of the makers of such, machinery as is called for below will oblige us by sending name and address, mentioning the number of the inquiry. We cannot forward catalogs. We have inquiries as follows:

58—From Germany, machines for making wood screws, and a plant for galvanizing wire nails.

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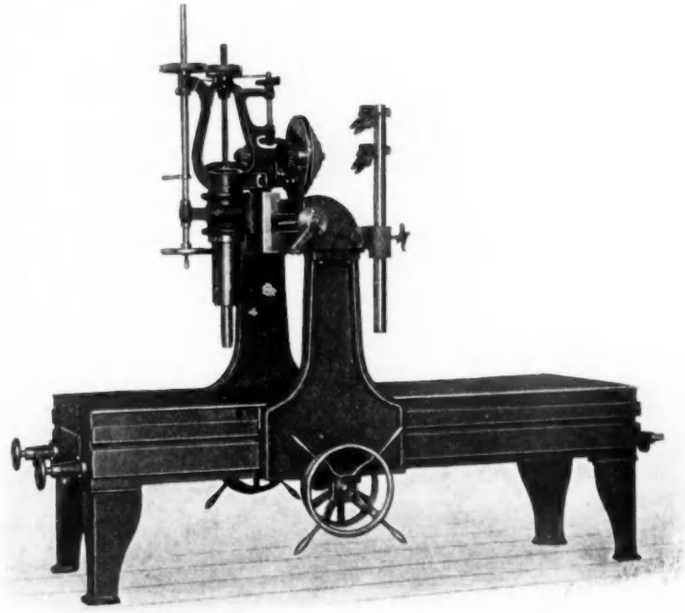
Rectangular Drilling Machine.

The accompanying half-tone represents a drilling machine of novel design which was recently built by Thos. H. Dallett & Co., of Philadelphia, for and from suggestions by Mr. Hugo Bilgram.

The machine was intended for a class of work of which Mr. Bilgram does a great deal, namely, automatic machines having as a common feature a pair of horizontal side frames carrying gear, drum and pulley shafts, levers, cams, etc., the shafts being carried in journals formed in bosses which are cast on the frames. In the manufacture of such machinery it is obvious that these bearings must be carefully located and in many cases with considerable accuracy, involving a good deal of labor when the work is done by the usual methods, especially when, as is often the case, the bosses are of different lengths, so that the surfaces on which the laying out is done are at different levels.

The machine is intended to do this laying out in addition to drilling the holes and with a degree of accuracy entirely beyond what is possible with a tram and scale. It will be seen to consist of the familiar Dallett drill-head mounted over a rectangular T-slotted table bed. The drill-head is mounted on a cross-beam supported on two uprights or housings. The drill-head is adjustable across the bed by movement on the beam, while the uprights are adjustable lengthwise of the bed, to which they are gibbed, as shown. The movement of the drill-head is by a screw, as shown, having a graduated dial, which is divided to read to thousandths, while the housings are driven by two screws of which the nuts are revolved simultaneously by a shaft extending across the bed, and having a pilot wheel at each end—one of which appears in the illustration—and which also carries a graduated dial reading to thousandths. The ends of the screws will be seen to be fitted with adjusting clamps, by which the slack of the nuts is taken up, the adjustment being such that one nut drives in one direction and the other in the opposite direction—the two thus acting together as one, but without slack in the threads.



RECTANGULAR DRILLING MACHINE.

It will be seen at once that with the work bolted to the table the drill can be traversed from hole to hole, the distances apart being determined with great exactness by the micrometer movements, with the additional advantage that parallelism of the holes is insured, which is more than can always be said when the work is done under a common drill press. It is also obvious that different hights of the different bosses above the table introduce no difficulty or inconvenience in the correct location of the various holes.

Of course the distances between two holes located at an oblique angle with the lines of movement of the machine must be given by their rectangular co-ordinates, and not, as usual, by their direct value, since the machine can only measure off those co-ordinates. With the direct distance apart known, the corresponding co-ordinates are easily calculated, and if the drawings are figured by giving the values of the co-ordinates no difficulty will be experienced in laying out all the holes included within the limits of the machine, which has a drilling range of 72 inches in length by 36 inches in width, while the spindle may be raised to give a clear distance above the table of 24 inches. The machine has both hand and adjustable power feed, is back-geared, and in the case of the one shown is driven by the Dallett rope drive with weighted idler, but it is obviously well adapted to electric driving and is so fitted if desired.

A GERMAN REAMER IDEA.

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We have received an applied sample of a filler and paint for castings and machinery sent out by the Pecora Paint Company, of Philadelphia. A roughly cast name plate, just as it came from the sand, has one end of it uncovered, then another portion shows it covered with the filler alone and the other end is covered with the paint. The material is hard and apparently durable, while the surface secured is excellent.

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Mr. Georg Kirkegaard, of 28 State street, New York, sends us a copy of a "Machinists' and Draftsmen's Data Sheet," compiled and published by him. It is 9x13 inches and printed on paper or card board, intended to be placed inside tool chests or on the wall of drafting rooms. Tables of cutting speeds, sizes of taps and drills, dimensions of steam, gas and water pipes, decimal equivalents, belting rules and tables, etc., are given.

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Getting and Keeping Trade—Machinists and Tailors.

Within a stone's throw of our office there was, not many years ago, a prosperous tailoring establishment, which was liberally patronized by the swell "chappies" of this part of the city. The proprietor, who for the purpose of this article shall be called Smith, was admirably made up for success in such a business. To the manners of a Chesterfield he united an air of graceful condescension, causing a customer to feel that he had been highly honored in being admitted to an inner circle in being allowed to purchase his clothing of such a distinguished gentleman.

The cutter of this establishment, who again for the purpose of this article shall be called Brown, was a native of France and was as well fitted for the discharge of his duties as Smith was for his. His products were fit to come from such a place, and in elegance of fit and finish fully supplemented the man who had sold them and justified the handsome prices he had charged.

Things went on in this way for some years, until one unhappy day Smith and Brown quarreled. Finally they agreed to disagree and Brown left the place to set up a rival though smaller shop, while Smith hired another cutter—in fact, to tell the truth, before the end came he hired several cutters. As the customers of the concern knew who had been responsible for the work they had had, the immediate result was the transfer of a considerable amount of custom from Smith to Brown, while the ultimate result was that Smith's establishment closed its doors and went out of business, while Brown occupies to-day a corner on Broadway and does a prosperous business at prices of a high degree of altitude.

Meeting Brown recently we congratulated him on the success of his venture in business and expressed surprise at Smith's collapse, remarking that Smith seemed to have all the elements of success in getting trade. "Oh, bless you, yes," said Brown, "a man like Smith can get trade easily enough, but only a tailor can keep it."

This epigrammatic remark contains a large truth which is not limited in its application to the clothing trade. We believe it to be a fact that every conspicuously successful machine shop in this country was in its beginning founded by mechanics who went into business for themselves because they knew what they wanted to do and knew how to do it, and for many years the leading men in such establishments—leading men, that is, in a business sense—were the original founders who had exchanged the hammer for the pen and the bench for the desk, but who remained, nevertheless, first and always, mechanics in every fibre.

Of late years the commercial spirit has been entering more largely into the business of machine production. Men have organized corporations and bought stock in them purely as an investment enterprise; they have then made one of their own number business manager and have hired mechanics to design and build machines to sell. Without in any way reflecting upon the men who thus, according to their light, have helped to develop the manufacturing industries of the country, and have risked their capital in doing it, we consider the changed conditions unfortunate. With dividends the only object in view the influence on mechanical progress is fatal. While in the end money-making is the chief object of all industrial enterprises, it is nevertheless true that if we are to advance in the future as we have in the past there must also be something of that spirit of enthusiasm with which all mechanics regard their work and which does not look with abject fear upon everything which savors of an experiment. Moreover, we do not believe that in the long run establishments conducted on these lines can maintain themselves against those conducted in the old way. Machinery to a greater extent than perhaps any other commodity goes to men who are expert judges of what they buy, and however successful the glib business man may be in making initial sales, later ones will not be made so easily, unless the goods are up to the standard set by rivals.

It must be recognized that in a mechanical business mechanical ability is of paramount importance, and that mechanics, as such, should have a voice in the highest councils of such an establishment. In other words, instead of such men figuring simply as employés, they should be an integral part of the organization if permanent success is to be expected. Conspicuous mechanical and business abilities are rarely found in the same man, but the rarity of the combination does not lessen the importance of the mechanical end of it, nor does the frequent necessity of employing two men to complete the combination justify the thrusting of the mechanic in the background as an employé, whose chief duties are to take orders where he should give them, and to follow where he should lead.

To paraphrase Brown's remark: "A business man may get machinery trade easily enough, but only a mechanic can keep it."

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La Bourgogne's Loss.

The loss of La Bourgogne reminds us that there are other things more terrible than war, and one of the things it teaches is that in these days people should not cross the Atlantic in single screw vessels. Twin screw vessels have a solid longitudinal bulkhead extending from stem to stern above the keel—in a position where no such bulkhead can be placed in a single screw steamer. This bulkhead very much increases the time a vessel will float after serious collision, if indeed it does not prevent sinking altogether.

The tragedy, which at this writing seems also a black crime, teaches again the lesson which for some time has been understood by the initiated, *i. e.*, do not cross the sea in a French steamer. French seamen are not good seamen, and French seamen are cowardly poltroons, who, to save themselves at such a time, will send women and children to death. The record of one woman saved, and that one by no effort of any member of the crew, ought to be sufficient to insure that no woman, and for that matter no real man either, should ever again cross the ocean in a French steamer, so long as steamers in which the English language is spoken are available. The Bazaar fire in Paris showed, too, that French sailors are by no means the only

Frenchmen who will in the presence of danger ignore man's natural duty to protect women, and fight them viciously for the preservation of their own lives.

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Questions and Answers.

Name and address of writer must accompany every question. Questions must pertain to our specialties and be of general interest. We cannot undertake to answer by mail.

(77) R. J. H., San Antonio, Tex., writes: Our firm wants to make its own light steel castings—say from 50 pounds down. Can we use our brass furnace and crucibles, fired by ordinary foundry coke, for melting? Is the annealing furnace an expensive affair—I mean one only large enough to take, say 500 pounds of light castings, such as pinions weighing from 5 to 25 pounds? etc. Can we buy pig steel in the open market? Will $300 to $400 be sufficient to install a small plant? A.—It is absolutely impracticable to make steel castings on a small scale. It is a trade entirely unlike ordinary founding, requiring very expensive melting apparatus. The molds are prepared in a very different way from any molds used in a foundry. There are few who understand the business, and without competent men in every part of the work no castings could be made. The annealing oven for steel castings is for the purpose of relieving unequal strains. See article on the Tropenas process in this issue.

(78) C. D. J., Rockford, Ill., writes: The following rule for computing the power of a belt is from the mechanical column of a paper that comes to me: "Multiply the number of square inches in contact with the smaller pulley by the speed of the belt in feet per minute and divide by 36,000. The result will be the horse-power that may be transmitted by a double belt under the most favorable conditions." Is this rule to be relied on? A.—Our correspondent may rely upon it that the "rule" is wrong in principle and may be made to give absurd results, and no results that should be relied upon or followed. Say that we have a 12-inch double belt running at 1,000 feet per minute on two pulleys, 48 inches and 24 inches diameter, respectively, and that the belt contact on the small pulley is 150°, or 5-12 of the periphery. Then the length of the circumference of the pulley in contact with the belt will be $24\times3.1416\times5\text{-}12=31.416$, and the area will be $12\times31.416=376.992$. Then, according to the rule, $376.992\times1{,}000\div36{,}000=10.4$ horse-power. With belt surface and pulley surface in good condition there should be practically no slipping of the belt on a pulley 24 inches diameter and with the assumed area of contact. Then allowing 40 square feet of double belt per minute per horse power, which is sufficient, and remembering that the belt is 1 foot wide, $1{,}000\div40=25$ horse-power, which such a belt, under the assumed conditions, should certainly transmit. The rule quoted by our correspondent could also be made to give this result if the pulleys were assumed large enough, although, if no slipping of the belt occurs, a certain area of belt per minute can only transmit a certain horse-power whatever the diameter of the pulleys may be. With pulleys 96 inches and 48 inches diameter, respectively, the same belt speed and the same included angle of belt contact as before the quoted rule would give double the previous result, or 20.8 horse-power, and a sufficient further increase of pulley diameter or of belt contact would bring the result up to the correct figures. The "rule" is all right if you have the precise pulley area to bring it right. As a general rule for belt transmission it is worthless.

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One of the latest games is to advertise for men as engineers, electricians, etc., and when replies are received inform the applicants that the subscription price of a hitherto unheard of journal must first be sent, as all applicants must be subscribers. It is a humbug which none of our readers would be apt to be caught by, but they might warn some others who are in outer darkness. The scheme hails from Cleveland, and is perhaps a variation of the oil swindling game.

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Personal.

Mr. Wyman, of Wyman & Gordon, Worcester, Mass., expects soon to go to Europe on a business trip.

Mr. Joshua Rose will arrive from Europe on the 16th of July, and letters may be addressed to him care of "American Machinist."

Mr. Adolph Wahle has resigned his position as superintendent of the Bettendorf Axle Company and will establish the Wahle Machine Works at Davenport, Ia.

A report has been published in at least one New York paper announcing the death of Mr. Lucian Sharpe, of Providence. It is, however, a false report. Mr. Sharpe is at Badnanheim, Germany, and late information from him is that he is improving.

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Technical Publications.

The "Marine Review," of Cleveland, Ohio, has published the "1898 Blue Book of American Shipping." It constitutes a complete directory of United States maritime affairs, there being a list of over 6,000 coast and river steamers, including practically all coast vessels of over 100 tons, 6,000 masters, mates and engineers' names and addresses, and complete directories of the Society of Naval Architects and Marine Engineers, Society of Naval Engineers, National Board of Steam Navigation and of departments of the United States Government with which marine men have business. There are also lists of ship builders and a list of 500 concerns that own 3,000 of the better class of coast vessels. There is also a list of 400 ship builders of the world and one of 1,280 owners of 10,000 of the largest vessels of the world. There are fine engravings of many of the leading naval and merchant vessels, with portraits of leading men who are in one way or another identified with shipping affairs. It is a book which we should consider indispensable to those who have anything to do with shipping in this country. There are 491 7x10-inch pages. Price, $5.

NOTE SUR L'UNIFICATION DES FILETAGES ET LEUR INTERCHANGEABILITÉ SUR LE CONTINENT EUROPÉEN (Remarks upon the Unification of Screw Threads and Their Interchangeability upon the European Continent.) By F. G. Kreutzberger, Mechanical Engineer, Puteaux, France.

This 19-page pamphlet, reproduced in fac-simile from round-hand manuscript, is an analysis of the advantages and defects of leading systems of screw threads now in use, with suggestions as to one which, it is hoped, may win an acceptation more general than is accorded the old ones.

After a discussion of the Whitworth, Sellers and other systems, the author concludes that, in so far as it relates to the form of the thread angle, truncation and the absence of curvilinear clearance, the Sellers should be followed. He proposes, however, a new scale of diameters and pitches.

He suggests, by analogy to the American classification, that the diameters be graduated in differences of 1 mm. from 6 to 10 mm. and of 2 mm. from 10 to 80 mm. In larger diameters he does not consider that the plan of interchangeability would be profitable. The old systems may then be employed and the following formula for determining the pitch is approved:

$$p = \sqrt{14.5 \text{ mm.} + 1.3\,D} - 4 \text{ mm.}$$

Remarking that, in general, the greater the diameter of a screw the less should be the inclination of the thread, he gives a table showing some of the diameters, pitches and inclinations under various systems, with theoretical and practical mediums deduced therefrom.

He then offers a table of diameters, pitches, interior diameters and truncatures, which was introduced by him at the artillery works, Puteaux, in 1876. It follows to a diameter of 58 mm. the formula:

$$p = \frac{D}{10} + 0.4 \text{ mm.}$$

which up to a diameter of about 40 mm. produces a scale resembling that of the German engineers.

Beyond 58 mm. diameter the change of 0.2 mm. in the pitch occurs only with each alternate change of 2 mm. in the diameter. The expediency is considered of having several diameters of bolt correspond to a single pitch, in order that a larger bolt may be substituted to compensate for the wear of a smaller one, but the author argues against it and in favor of the system as above proposed. In regard to the play of the nuts and bolts, he judges that conditions prevailing in each line of industry must rule, but that the nominal theoretical diameter should be the maximum limit for the bolt and the minimum for the nut. The clearance should be as little as is compatible with the particular circumstances, the play be-

ing given in the nut, the bolt, or in both. From the point of view of interchangeability he thinks it inexpedient to provide for making the smooth part of the bolt larger than the threaded portion.

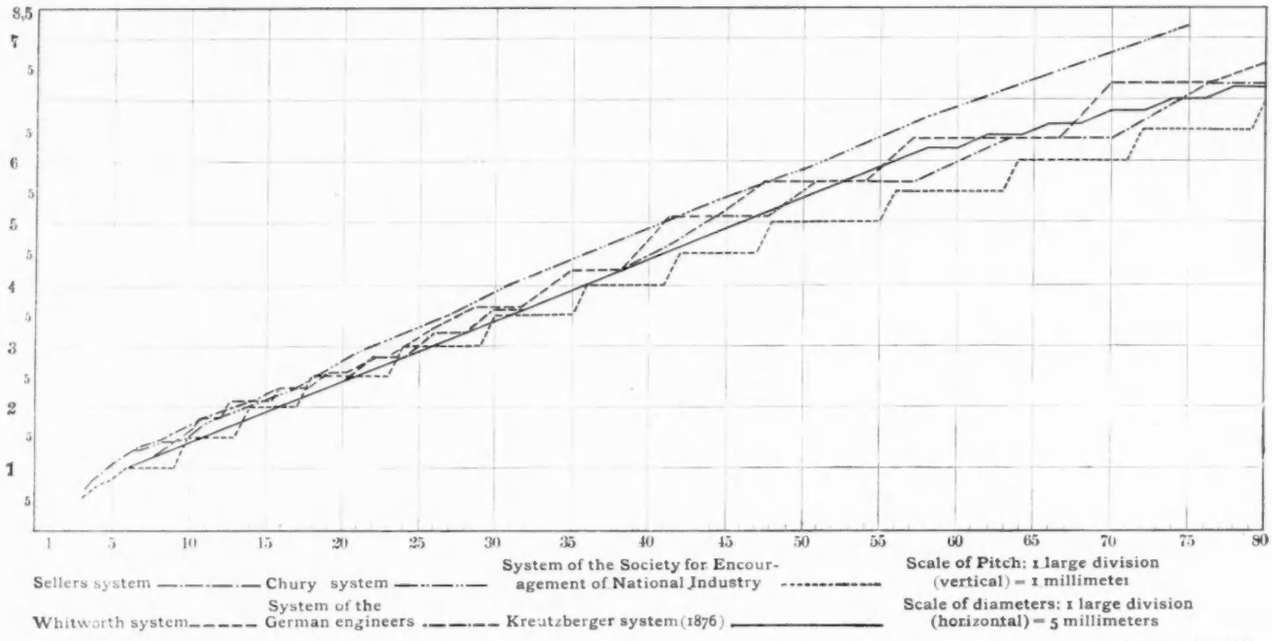
He observes the facility of measurement offered by the Sellers form of thread. He remarks the injury often done to nuts and bolt heads by the use of a wrench that does not fit, and therefore offers a table intended to reduce the variety of sizes to a minimum and thus reduce the number of the machinist's chances to get hold of the wrong wrench.

Finally he decides that the system of measurement of threads most expedient and most likely to receive universal approval is the metric system.

At the end of the pamphlet is a chart showing the relative variations of pitches and diameters for the principal systems of unification of threads. This chart is shown herewith.

Graphic Representation

of the relative variations of pitch and diameter for the principal systems of unification of screw threads


8,5
1
2
3
4
5
6
1 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80
Sellers system
Chury system
System of the Society for Encouragement of National Industry
Whitworth system
System of the German engineers
Kreutzberger system (1876)
Scale of Pitch: 1 large division (vertical) = 1 millimeter
Scale of diameters: 1 large division (horizontal) = 5 millimeters

American Machinist

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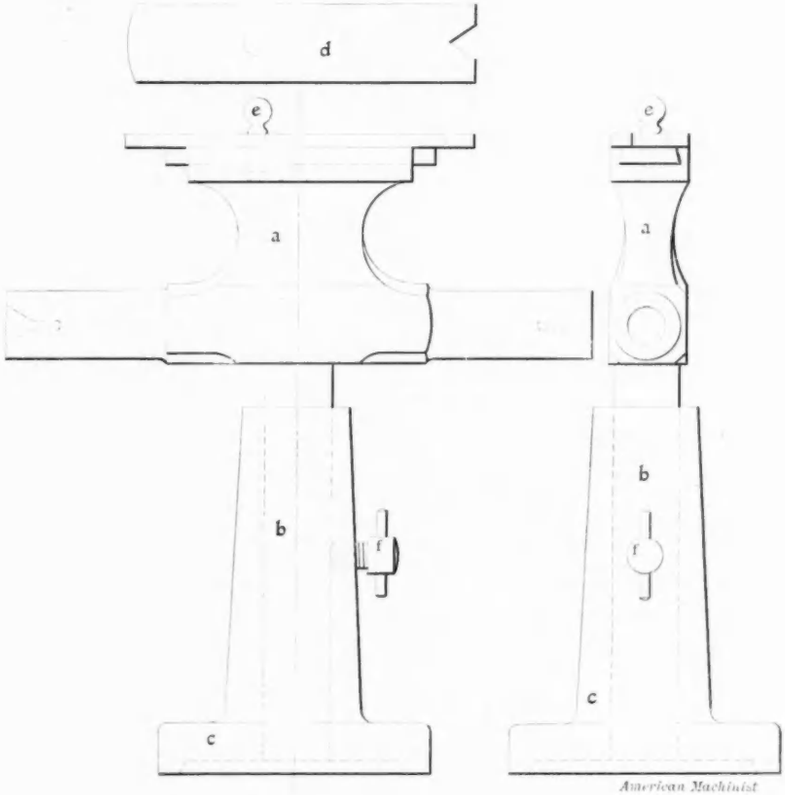
A Gear Cutter Centering Device.

The accompanying cut shows a new and novel device used in the American Tool Works Company (Cincinnati) gear cutting department, for centering gear cutters, slitting saws, or any form of cutter, within its range, that may be used on a milling machine. Center lines on cutters are sometimes not central and milling machine centers are not always sharp.

Wishing to center a cutter, place the device between the centers, loosen the binder *F*, which is simply to hold the base in place, slide the base *C* down until it is brought to bear on the platen of machine, and tighten binder *F*. This will center the V with centers of index head, and should the center of foot block be high or low, which is often the case, where the center in footstock is adjustable for tapers, it will be readily seen at base *C*, as it would not come down fair on the platen.

Slide the V up to the cutter by means of handle *E* (which also serves to keep slide in place) and move the cross slide in or out to center the cutter. This is all done very quickly, and without any possibility of a mistake, as the slide *D* has a greater angle on one side than the other, and should it be taken out of its bearing at any time cannot be put back the wrong way.



American Machinist

CENTERING DEVICE FOR GEAR CUTTERS.

Commercial Review.

NEW YORK, Saturday Evening, July 9, 1898.

THE MACHINE TOOL MARKET.

The close of the first half year of 1898, completing a fiscal year of United States foreign trade, has not left us in want of a commercial triumph to celebrate. Our exports of manufactures have increased by 60 per cent. in three years, 100 per cent. in ten years and with the commercial expansion that must accompany our debut as a political world power they are bound in the future to increase by per cents untold. A summary of machine exports for May, the latest yet compiled with precision, and published by the Bureau of Statistics, will be found later in this article, and among them it will be noticed that the exports of metal working machinery for the month amounted to the large sum of $461,758. Some of the machine tool men we meet seem to feel that the export trade is going to fall off, just because it is so very flourishing at present. They think it is too good to last. "Why, the other day," remarks one, "I was shipping some tools to Europe on a German liner and she was literally surrounded with lighters all having machinery on board. That kind of a thing must come to an end before long." We think otherwise. "To him that hath shall more be given" is very true in finance and commerce.

The demand for machine tools from Germany and France seems now to be greater in proportion to that from England than at an earlier stage of the export movement. One reason suggested for this is that the English trade was more largely in bicycle machinery than the Continental and this has had its day. It is remarked that heavier machinery is now being sent to Europe than used to be, which accounts in part for its high aggregate value.

The sentiment among commercial writers is that general business has held its own since the war began remarkably well under the circumstances, and we may add that machine tools are a line that seem to have fared better than many others. The amount of conservatism in the talk of local sellers is not enough to preclude the idea that business is holding its own relatively to the season and is doing much better than the war might have led one to fear. Some even seem to have made better sales in June than in May. But the reports of local sellers do not, we think, do justice to the degree of activity at the shops. Some plants have so much work on hand that tools cannot be turned out as fast as they are wanted. The national horizon is now beginning to show daylight, and since the machine tool market has braved the darkness so resolutely there is every reason to hope that it will soon, with the vigor of morning, rise to new activity.

Eight large iron working tools have been ordered for Mexican shipment. Among domestic sales one of fourteen lathes is reported.

GOVERNMENT CONTRACTS.

New United States Government advertisements include machinery and tools for the Portsmouth, N. H., Navy Yard, bids to be opened July 26, and a sale of old material at Washington and New York, bids to be opened August 5.

The awards based upon the bids to furnish tools and other machinery for the New York Navy Yard, which were opened June 28, have not yet been made public. When available we hope to mention the more important. Price is only one of several matters considered in making the awards, but it may be said that Manning, Maxwell & Moore, New York, were the lowest bidders on eight out of twenty-one machine tools, and on five out of thirty-three other items, of which they did not compete on all. Other low bids were more scattered.

The following awards have been made by the Army Chief of Ordnance for ninety-five 12-inch disappearing mortar carriages: Rarig Engineering Company, ten carriages at $5,325; American Hoist & Derrick Company, fifteen carriages at $5,350; Builders' Iron Foundry, twenty carriages, at $5,265; Columbus Machine Company, fifteen carriages at $4,890; Lake Erie Engineering Works, twenty-five carriages at $5,000; Maryland Steel Company, ten carriages at $5,600.

At the Springfield, Mass., Government arsenal a great many new tools are to be installed. More than 100 have recently been estimated upon, including fifty-four milling machines of the same pattern. A certain company in this locality has received the award to furnish more than half of these milling machines.

MACHINERY EXPORTS FOR MAY.

According to the "Monthly Summary of Finance and Commerce" exports of metal working machinery for the month of May, 1898, amounted to $461,758, and for the eleven months ending with May $4,164,931. The figures for April have previously been reported, $390,213. Electrical machinery exports were: For May, $180,494; for the eleven months, $1,883,306; for April, $185,314. Pumps and pumping machinery: For May, $167,302; for the eleven months, $1,835,036; for April, $160,246. Shoe machinery: For May, $110,662; for the eleven months, $832,936; for April, $81,536.

Exports of other lines of machinery, which, having been separately classified for a longer time, permit of a more extended comparison, included: Locomotive engines, for May, 1898, fifty-three in number, valued at $446,583; May, 1897, forty-one, at $442,820; April, 1898, twenty-nine, at $191,764; eleven months ending May, 1898, 419, at $3,429,665; eleven months ending May, 1897, 319, at $3,059,348. The figures upon stationary engines were: For May, 1898, forty-seven in number, at $21,559; May, 1897, thirty-six, at $28,306; April, 1898, forty-four at $48,029; eleven months ending May, 1898, 522, at $377,017; eleven months ending May, 1897, 382, at $295,672. Upon boilers and parts of engines they were: For May, 1898, $153,641; May, 1897, $41,820; April, 1898, $46,986; eleven months ending May, 1898, $880,111; eleven months ending May, 1897, $635,420. Upon printing presses and parts thereof they were: For May, 1898, $55,073; May, 1897, $52,196; April, 1898, $68,915; eleven months ending May, 1898, $818,018; eleven months ending May, 1897, $593,453.

MISCELLANEOUS.

The first large sugar factory in Paraguay is soon to be established. Most of the machinery has been secured in England.

Five 120 horse-power engines to be coupled directly to blowers are reported to have been ordered by the Mount Lyell Mining & Railway Company,. of the Brush Electrical Engineering Company.

Ten locomotives and 1,000 freight cars are said to be desired by Mr. E. V. Sedgwick, City of Mexico, as superintendent of motive power of the Interoceanic Railway.

The Walker Company, Cleveland, Ohio, has recently secured a contract from the Union Carbide Company, of Chicago, for twenty 500 horse-power alternating current generators, single phase, sixty cycles, to deliver a current of 2,500 amperes at 200 volts. Besides these there will be five 100 horse-power direct generators, as exciters, and a complete switchboard for all of these machines. The Union Carbide Company has acquired the rights of manufacture of calcium carbide for the United States, and will have its main works at Sault Ste. Marie. The works are to be built for the accommodation of forty generators and forty electric furnaces, where the lime and carbon are fused into calcium carbide, the twenty generators in this first contract being but the initial order. It is understood that some of the gas developed from the carbide is to be used for power purposes.

We hear from the Weber Gas & Gasoline Engine Company, Kansas City, Mo., that it finds business very good, being well booked with orders and running overtime. It has just installed another 74-inch boring mill.

CINCINNATI REPORT.

Cincinnati seems at present to be a hive of activity in machine tools. Some items which were crowded out of last week's report from that industrial center are given below.

The Bickford Drill & Tool Company has lately placed orders for new machine tools for its own use with the Gisholt Machine Company, Jones & Lamson Machine Company and the Bradford Mill Company. Its new style

No. 1 radial drill will soon be out. Although it has ceased running nights, it has its full day force on full time.

The Cincinnati Milling Machine Company is adding to its present plant a 50x110 foot three story and a 50x40 foot two story addition. The ground floor of the latter will be used for an engine and boiler house. A new engine and boilers and a thoroughly up-to-date equipment of machine tools will be put in.

R. K. Le Blond has erected at Linwood, Ohio, near Cincinnati, a large new building, which will be supplied with power by a 250 horse-power Columbian engine and will contain a first-class new equipment of machine tools.

The American Tool Works Company has received from the Russian Government an unusually large order for machine tools, of which it will take about four months to complete the shipments. It has a $30,000 order from German parties, to be filled with all the promptness possible, and has just sold some thirty-four monitor and engine lathes for England.

On account of the Cuban war and the destruction of plantations upon that unhappy island many sugar planters have transferred their interests to the State of Vera Cruz, Mexico, where the amount of money being invested is considerable. As a result, many orders come thence to Cincinnati for sugar machinery. The Blymyer Iron Works Company has shipped to the city of Vera Cruz a carload of sugar machinery, to be followed by more of it. Inquiries come from and shipments are made to other parts of Mexico also, and Central and South America.

The Laidlaw-Dunn-Gordon Company, manufacturing pumps, is working overtime, and reports that if the amount of business it is actually doing were known it would cause some surprise. It has made large shipments to Australia and England of hydraulic tobacco machinery and many pumps of general lines have been sent to those and other countries. Domestic sales are very good. In addition to the routine in small pumps some have been sold of from 1,500,000 to 3,000,000 and 5,000,000 gallons capacity per day.

J. H. McGowan & Co. also have shipped a carload of hydraulic tobacco machinery to Australia, and have some home orders in the same line, which seems to be quite active at present. They are receiving some fine export orders for pumping machinery.

The Stewart Iron Works have a $10,000 contract for architectural iron for the Rawson Building and an $8,000 one for the Pearl Street Market House, both of Cincinnati. They will also furnish 100 tons of material for the Soldiers' Home, Danville, Ill.

The Cordesman Machine Company has an order for some wood-working machinery for the Mare Island Navy Yard, and is building large machines for parties in Toledo and Indianapolis.

The Randle Machinery Company notices increased demand for goods connected with threshing machinery; also inquiries for engines, for which it has orders from saw-mills in Ohio and Tennessee.

Jonathan Creager's Sons have recently made shipments of brick machinery to Mexico.

CHICAGO MACHINERY TRADE.

By common consent, or by the operation of natural causes, the months of July and August are given over to the farmer wherein to garner his crops. The machinery trade during this period is overwhelmed with modesty. It is thus now. It is not true that all trade is with the farmer in this market. Neither is it true that all trade is indirectly influenced by agricultural conditions. But this class of producers is dominant in a way that brooks no present interference. It is perhaps a timely remark that the crops which they are now gathering are the largest in many a year and that the promise of this beneficent influence in the future is correspondingly voluminous. For the present there is some buying of machinery by the miscellaneous shop and factory, but on the whole the trade is attenuated.

Government work is a vital influence. There are several plants in the West and Northwest that are now engaged in the manufacture of gun carriages. The carriages are for guns of the disappearing type, and are intended for coast defense. The national scare of bombardment at coast cities is bearing good fruit in more ways than one, and not least among the beneficiaries are the machinery men. One or two quite large orders for lathes and other tools were last week placed by companies who have secured gun carriage contracts.

The agricultural implement shops are busy, and continue to prepare for a large business during the next season, now beginning. Wagon works are also among the best possible customers of the machinery men, for they have sold their entire output and are looking for an equally good trade the coming year. Wood-working plants generally are not very active.

The iron market here is much more active than is customary at this period of the year. The new trade is not large in pig iron, but makers are well loaded up with contracts, and are looking for any additional tonnage. Most departments of the Illinois Steel Company are too busy with old orders to close down for repairs. They have at hand, however, duplicate parts of all kinds of machinery they use, and if anything breaks down it is only a matter of hours or minutes to get machinery in motion again. A protracted delay on account of breakage is a thing of the past, save in rare instances. Merchant steel is in good demand and prices are firm. Plates are active and structural shapes are selling in large volume.

Charles H. Besly & Co. report trade during the first half of the year the best for any six months in many years. Business with them is now quiet.

A well-known tool and supply house has booked several large orders during the past week.

The Western Electric Company is about to build a large addition to its plant in this city.

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Quotations.

NEW YORK, Monday, July 11.

Iron—American pig, tidewater delivery:

No. 1 foundry, Northern	$11 00 @ 11 25
No. 2 foundry, Northern	10 50 @ 11 00
No. 2 plain, Northern	10 00 @ 10 50
Gray forge, Northern	9 75 @ 10 00
No. 1 foundry, Southern	10 50 @ 10 75
No. 2 foundry, Southern	10 00 @ 10 25
No. 3 foundry, Southern	9 75 @ 10 25
No. 1 soft, Southern	10 50 @ 10 75
No. 2 soft, Southern	10 00 @ 10 25
Foundry Forge, Southern	9 50 @ 9 75

Bar Iron—Base—Mill price, in carloads, on dock: Common, 1.05 @ 1.10c.; refined, 1.10 @ 1.20c. Store prices: Common, 1.25 @ 1.35c.; refined, 1.30 @ 1.50c.

Tool Steel—Base Sizes—Standard quality, 6 @ 7c., with some grades perhaps a little less; extra grades, 11 @ 12c.; special grades, 16c. and upward.

Machinery Steel—Ordinary brands, from store, in small lots, 1.40 @ 1.45c.

Cold Rolled Steel Shafting—Base sizes, from store, 2.05 @ 2.10c., according to quantity.

Copper—Carload lots: Lake Superior ingot, 11⅝ @ 11¾c.; electrolytic, 11⅜ @11⅝c.; casting copper, 11¼ @11½c.

Pig Lead—Carload lots, 4.00c., f. o. b., New York.

Pig Tin—For 5 and 10 ton lots, 15.60c., cash, f. o. b.

Spelter—Carload lots, 4.70 @4.80c., New York delivery, for ordinary brands.

Antimony—In cask lots: Cookson's, 9⅝ @ 9¾c.; Hallett's and French E. B., 9c.; United States, 8¾c.

Lard Oil—Prime city, ice pressed, 50c., in small wholesale lots, and a cent or two less in large ones.

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Manufacturers.

The Titusville (Pa.) Forge Company will purchase a large boring mill and a 50-inch lathe.

Samuel Lobsitz, Germantown, Pa., will add new machinery to his plant for the preparation of fine stock and wool wastes.

Besides erecting a large brick warehouse at Manitowoc, Wis., the Goodrich Transportation Company expects to erect new machine and carpenter shops.

The Peoria Cooperage Company will build a big factory at Escanaba, Mich., and unless all calculations are wrong it ought to be in running order by September 1.

Bids are being asked for the construction of a brick and stone machine and repair shop, 148 by 30 feet, to be used by the Baldwin Locomotive Works, Philadelphia.

The new Indian Head Mill, at Cordova, Ala., will build a duplicate plant. Work on the new mill will begin next month. The present mill is the largest one in Alabama, but notwithstanding that fact the plant is to be doubled, and it develops that this was the original intention of the owners, and the present power plant was so constructed that it will be able to furnish the motive power for both mills. Consequently no motive power, such as engines, boilers, etc., will be purchased, though there will be additions to some of the minor machinery in that

department. The company is doing a fine business and the prospects for the future are of the most encouraging character.

The mining machinery belonging to the Asbestos Company, Danville, Ont., was completely destroyed by a fire recently.

The Central Iron & Steel Company, of Harrisburg, Pa., is about to rebuild the flanging plant which was burned a short time ago.

At Chester, Conn., A. H. & J. S. Deuse will soon commence the erection of a factory. Modern machinery will be installed.

The Pioneer Company, of Ottawa, Ill., which a short time ago lost Factory B by fire, has decided to rebuild that part of the plant.

Stacy Reeves & Sons are taking bids for a two story 68-foot extension to the machine shop at the Midvale Steel Works, Nicetown, Pa.

The Biggs Boiler Company's plant at East Akron, Ohio, was recently destroyed by a fire. Practically all of the machinery was destroyed.

Ernst R. Behrend & Co. are to erect at Erie, Pa., a new paper and pulp mill, in which it is estimated employment for 300 men will be found.

The two machine rooms at the Hollingsworth & Whitney pulp mill at Winslow, Me., will be extended 40 feet, thus allowing more room for new machines.

Wyman & Gordon, of Worcester, Mass, manufacturers of drop forgings, have opened an office at 116 Liberty street, New York, with Mr. F. A. Dennis in charge.

The Waumbek Woolen Company, of Milton Mills, N. H., with a capital of $60,000, has been incorporated. The company has bought the old Waumbek Mill, which it will repair.

Articles of incorporation have been filed by the Acme Mfg. Company, of Bussey, Ia. Messrs. A. R. Miner, E. A. Johnson, J. T. Hughes and J. Ross Carpenter are the incorporators.

The Clinton (Ia.) Bridge & Iron Works have the frame erected for an extensive addition to their building. The addition will be in the rear of the new office and north of the present building.

A company has been formed at Elwood, Ind., by E. S. Lea and others to manufacture electrical goods and light machinery. A shop will be erected at once and equipped with new machinery.

The North Penn Iron Company, of Camden, N. J., has been incorporated. The object of the company is to manufacture architectural iron work. The resident corporator is John Harris, of Camden.

The Vaughn Machine Company, of Peabody, Mass., has commenced the erection of a new brick factory. The building will be 200x55 feet, three stories high, and will be used wholly for manufacturing purposes.

Harry Davenport, Blissfield, Mich., has almost completed a two-story brick building, to be used as a machine shop for general machine work. It will be equipped with the latest and most modern machinery and tools.

The C. O. Burns Company, of New York city, has been incorporated to manufacture metal novelties by Chas. O. Burns, 393 West End avenue, W. J. Cox, of Brooklyn, and C. F. Spaulding, of East Orange, N. J.

The J. B. Ford Company, of Wyandotte, Mich., is to engage in the manufacture of starch and soda. About 100 men will be employed. J. B. Ford, Jr., is president, and J. G. McPhirder, of Zanesville, Pa., vice-president.

Franklin Manufacturing Company, Franklin, Pa., has been incorporated to manufacture asbestos specialties; capital $30,000. Incorporators: C. J. S. Miller, R. J. Evans, Charles Miller, S. A. Megeath and F. H. Johnston.

The Wais & Roos Punch & Shear Company, of Cincinnati, Ohio, has made arrangements to manufacture in the United States heavy riveting machines, forging presses, armor plate machines, etc., invented and manufactured in Germany by L. W. Breuer, Schumacher & Co., Kalk, Germany.

W. O. Barnhill, Greenville, N. C., will rebuild his machine shops.

An addition is to be made to the Victoria Mill, near Wallingford, Pa.

An addition is being built to Cramshaw's machine shop at Auburn, Me.

At Anaconda, Mont., Chas. F. Martin will erect an addition to his machine shop.

The Riter & Conley Company, of Pittsburg, is to erect a new iron shop in that city.

The Wheeling Steel & Iron Company, Wheeling, W. Va., will soon erect a new mill.

The J. G. Brill Company, of Philadelphia is erecting a new car truck building 165x16 feet.

David M. Hess is putting up a four story brick factory, 86x45 feet, at Philadelphia, Pa.

The Crown Cork & Seal Company, of Baltimore, Md., is to erect an addition to the factory.

Bids are wanted for an electric light plant at Wellington, Ohio. F. A. Chapman, village clerk.

Crowder & Anderson, Waynesboro, Va., are contemplating the installation of saw-mill machinery.

James McKenna has decided to commence the erection of his foundry building at Joplin, Mo., at once.

The Swartzlander mill near Doylestown, Pa., recently burned, is to be rebuilt by Arthur Chapman.

The Lowell (Mich.) Cutter Company began to improve its factory recently by building a 20x90 foot addition.

Three additional stories are to be built to Hess' mill at Oxford and Mascher streets, Philadelphia, Pa.

Pelgram & Meyers, of Harrisburg, are to make an addition to their mill, 132x50 feet and three stories high.

Bids are wanted for pumps, heaters, plumbing, electric lighting apparatus, etc., in the boiler house at the Danville, Ill., branch of the National Home for Disabled Volunteer Soldiers.

The James J. Reagan Manufacturing Company, which has been incorporated under the laws of Connecticut to operate mills at Rockville, will require considerable new woolen machinery.

A large addition to the works of the Larkin Soap Manufacturing Company, Buffalo, N. Y., is to be erected. The structure will have a frontage of 182 feet. The building will be 150 feet deep and eight stories high.

Articles of incorporation have been filed at Mount Holly, N. J., by the Davis & Hancock Company, which formerly had its plant at Bridesburg, Pa., to manufacture jute, cotton, silk and wool fabrics. New machinery is wanted.

The Clark Engine & Boiler Company is making arrangements to erect a large addition to its plant on North Church street, Kalamazoo, Mich. An addition 40x100 feet, two stories high, will be built at once to be used as a machine shop and blacksmith shop.

General Wm. P. Snyder and Morris Hoats returned from Europe on Friday. They spent several months in Germany and succeeded in their mission of concluding negotiations for the transfer to this city from Schweinfurth of a large manufacturing plant. It will employ several hundred hands and a mill will be erected at once.

The Syracuse Construction Company, of Syracuse, N. Y., is erecting new buildings in connection with its electric railroad plant. The buildings consist of a boiler house 60x90 feet. There is also an engine room 65x80 feet, having a steel framework and brick sides. The other building is a car barn and repair shop 65x170 feet. This building also has steel framework construction, with corrugated iron sides. These buildings have been designed and are being erected by the Berlin Iron Bridge Company, of East Berlin, Conn.

The jute bagging manufacturing firm of Lehman, Kraus & Rosenthal will move their plant to Louisville from Peru, Ind. The firm will make temporary use of the old Tapp plant, at Nineteenth and Walnut streets. The capacity of the place will be doubled.

The H. N. Strait Manufacturing Company, of Kansas City, Mo., in addition to its present quarters will occupy a new brick structure July 1. The new building joins the present plant, and to this will be added new machinery which

Manufacturers continued on page 38.

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Business Specials.

Gear wheels, gear cutting. Grant; see page 16.

Forming Lathes. Mer. Mach. Tool Co., Meriden, Conn.

Selden Packing for stuffing box, with or without rubber core. Randolph Brandt, 38 Cortlandt st., N. Y.

Cutters, reamers and small tools, regular and special; vertical millers, cutter and surface grinders, shears and punches. R. M. Clough, Tolland, Conn.

Wants.

Situations and Help Advertisements only inserted under this head. Rate 30 cents a line for each insertion. About seven words make a line. The cash and copy should be sent to reach us not later than Saturday morning for the ensuing week's issue. Answers addressed to our care will be forwarded.

Situations Wanted.

Mechanical engineer, with extensive experience at designing light machinery and tools, is open for an engagement. Box 136, AMERICAN MACHINIST.

Foreman patternmaker desires change; dry or green sand or loam, large or small; cheap or best work; best references. Box 141, AMERICAN MACHINIST.

Middle-aged man, with technical education and experience on stamping and tin house machinery and tools, wants a position as supt. Box 135, AM. MACH.

Wanted—Position by young man (28), who is a machinist, draftsman and technical graduate; willing to invest some money. Box 122, AMERICAN MACHINIST.

Foreman patternmaker, good education and long experience, thoroughly competent to take charge of any class of work, desires situation. Box 140, AM. MACH.

Shop supt. with a practical engineering and business experience is open to a change; can design, make sales, or handle office; age 38; exceptional references. Address Box 128, care of AMERICAN MACHINIST.

A first-class, practical mechanical engineer wants position as general superintendent or manager of machine shop; up-to-date in all modern machine shop practice. Address Box 134, AMERICAN MACHINIST.

Purchasing agent for a large machinery manufacturing house wishes to make a change; would not leave vicinity of New York City; reference; present employers. Address Box 139, AMERICAN MACHINIST.

Help Wanted.

Wanted—A mechanical draftsman thoroughly experienced with steam engines. Address McKiernan Drill Co., 120 Liberty street, New York.

Wanted—First-class assistant layer-out for a large boiler shop. Address, giving wages desired and experience, Struthers, Wells & Co., Warren, Pa.

Mechanical draftsman to assist in designing automatic machinery and to make construction drawings; state experience and wages expected. John Adt & Son, F. B. Shuster, proprietor, New Haven, Conn.

Chuck Manufacturer—Wanted first-class machinist used to latest methods in above; state fully what experience in this line and in what shops, age and salary expected; replies treated in confidence. Box 129, care of AMERICAN MACHINIST.

Wanted—A large Chicago manufacturer wants a first-class machine shop foreman; one who understands handling men and modern machine shop practice; must be a hustler; no other need apply. Address Box 123, AMERICAN MACHINIST.

Mechanical draftsman wanted for city office; must be well up in hydraulics and modern steam engines; versed in shop tools and methods; to suitable person steady emp. is practically assured. Address, giving nat'nality, age, ex., ref. and sal. exp., Box 133, AM. MA.

Wanted—A mechanical draftsman, to work on Staten Island; hours 8 to 12, 1 to 5, Saturdays 4; experienced man, thoroughly familiar with shop practice, able to figure strains, design machines, tools, etc.; none but experienced men need apply; would prefer personal interview. C. W. Hunt Co., West New Brighton, Staten Island, N. Y.

Continued from page 37.

will treble the quantity of cooperage machinery, Monarch standard scales and hay presses now produced and double the working force.

It is reported that the Standard Oil Company will erect a large refining plant at Whiting, Ind.

Cadillac, Mich., is soon to have another woodworking institution. It will be a maple flooring mill, and will give employment to about 200 men.

The Kelley Match Machine Company will put in a machine shop at the Oxy-Hydogren Company's gas plant on South Justison street, Wilmington, Del.

The Board of Metropolitan Sewerage, 1 Mount Vernon street, Boston, Mass., will receive bids for construction of pumping engines to be used at Deer Island Park.

The Clark Engine & Boiler Company will erect an addition to its plant at Kalamazoo, Mich. The building, 40x100 feet and two stories high, will be used for a machine and blacksmith shop.

The foundry of Snead & Co., of Louisville, Ky., was recently gutted by fire. The damage amounted to about $100,000. The Snead & Co. Iron Works is composed of Chas. S. Snead, president; U. Snead, vice-president; Mr. W. R. Snead, general manager, and J. F. Arnold, superintendent.

A. Falkenau, formerly at Eleventh street and Ridge avenue, Philadelphia, has removed to 107 to 115 North Twenty-second street, where his facilities are greatly enlarged and improved. Mr. Falkenau's products are special machinery of various kinds, especially hydraulic and pneumatic machinery, also machine tools.

O. J. Beaudette & Co., of Pontiac, Mich., have had plans prepared for a manufactory 75x200 feet in size for the manufacture of surrey and phaeton bodies. It will be equipped with the most approved machinery for the purpose and with special machinery for conveying the shavings to the fire box in the boiler house. The estimated cost is $10,000. No contracts have yet been awarded.

Chester, S. C., is to have another big cotton mill in the very near future. The Eureka Cotton Mills is the name of the new enterprise, and its location is to be near the town of Chester. LeRoy Springs, C. B. Skipper and Waddy C. Thompson, of South Carolina, and Charles J. Webb, of Philadelphia, are corporators of the new enterprise, which the declaration says is to be capitalized at $60,000.

Work has been commenced on the large addition to be made to Galland's already big factory on the corner of Washington and South streets, Wilkesbarre, Pa. The new building will be 40x129 feet, four stories high and will be of brick. This will furnish much additional room and increase the capacity of the factory to such an extent that several hundred more girls and women will be employed.

A movement has been set afoot at Enterprise, Kan., to start a large flouring mill on the co-operative plan, it being expected that farmers will take stock in the hope of receiving thereby a higher price for their grain. Several farmers have already spoken for stock and it is believed that there will be encouragement enough to put up a 200 barrel mill. John Johns, a practical miller, is at the head of the movement.

The People's Light & Power Company, of Jersey City, N. J., are erecting a new boiler house in connection with their electric plant. The building is a modern structure in every respect. It is 60 feet wide and about 90 feet long, contains ample space for large upright boilers, and has an arrangement for the storage of coal in the steel bunker inside the building so that the fuel can be easily taken direct to the boilers. The tracks are arranged so that railroad cars will run into the building and discharge the coal directly into the bunker. It is of fireproof con-

Help Wanted—Continued.

Wanted—An associate in a successful engineering and contractor's office; must furnish a few thousand dollars; should understand drafting and supervising work; good op. for young man. Box 137, AM. MACH.

Wanted—An exp. mech. engineer, with a thorough business training, to handle a Western machine shop; also a first-class draftsman; one with experience on gas engines preferred. Box 138, AMERICAN MACHINIST.

Wanted—Experienced forger and blacksmith as foreman of shop; heavy and light work; good position; steady work for right party. Address, giving references and full particulars, P. O. Box 452, Pittsburg, Pa.

Machinist and mechanical draftsman—An interest in a long established and reputable mfg. concern can be purchased at a low figure by a person of ability and reputation. Address confidentially, giving full and specific data as to the personal, Box 132, AM. MACH.

Miscellaneous Wants.

Advertisements will be inserted under this head at 30 cents per line, each insertion. Copy should be sent to reach us not later than Saturday morning for the ensuing week's issue. Answers addressed to our care will be forwarded.

Best Calipers, Levels, etc. E. G. Smith, Columbia, Pa

Book, Dies & Die Making, $1. J. L. Lucas, Prov., R. I.

The Dutton Wet Twist Drill-Grinder is sold by the Garvin Machine Co., New York City.

Best and cheapest Bolt Header, made by Baush & Harris Machine Tool Co., Springfield, Mass.

For Sale—My stock in Chattanooga (Tenn.) Machinery Co. W. B. Catlin, 1315 Market Street.

Light and fine mach'y to order; models and electrical work specialty. E. O. Chase, Newark, N. J.

Wanted—June 6, 1895 (No. 23), issue of Am. Machinist. Address, with terms, Box 131, AMERICAN MACHINIST.

For Sale—Second-hand drill presses, engine lathes and planers. Dietz, Schumacher & Boye, Cincinnati, O.

Die makers, special mach'y and spec'lt'es wanted for manufacture. Bown Mach Works, Battle Creek, Mich.

For Sale—One Merriman bolt cutter, 3-8 in. to 1 1-2 in.; one 1-2 in. to 2 in.—new. The McLagon Foundry Co., New Haven, Conn.

The advertising department of the American Machinist has on hand 20,000 draftsm'n's thumb tacks; will send a box of ten to any draftsman in America on request; could use a postage stamp on box, but will send the tacks anyway.

For Sale—14 in. x 8 ft. Reed engine lathe, together with chucks, tools, &c., and a 16 x 42 in. Bridgeport planer; have not been used more than three months and are in first-class shape. Crocker & Lawson, 17 Ferry street, Binghamton, N. Y.

Institutions retiring from business having machine tools, brass or wood working machinery, will find it to their interest to correspond with us. We purchase complete plants or handle them on com. C. C. Wormer Mach Co., 55-59 Woodbridge st., W., Detroit, Mich.

A firm of engineers and tool merchants in England, doing a large business in American machine tools, is desirous of opening up communications with tool manufacturers in America, and will be pleased to receive their catalogues. Address Tool Co., care of the Cassier Magazine Co., 3 West 29th St., New York.

WANTED.

Experienced foreman to superintend machine and hydraulic forge departments, running nights. Address
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P. O. Box 595, Lynn, Mass.

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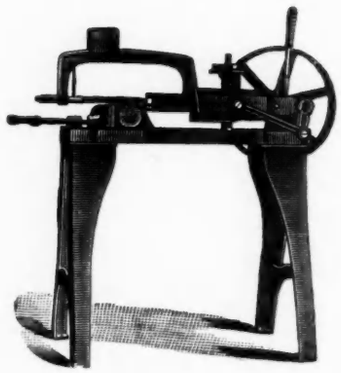

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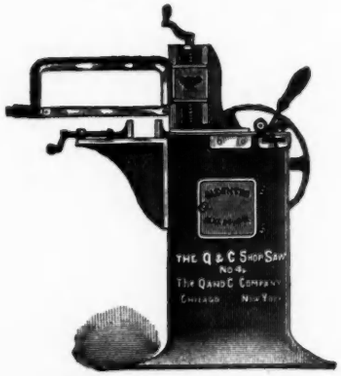

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Chicago. New York.

LONDON: Chas. Churchill & Co.
PARIS: Hounsfield & Fils.
BERLIN: Schuchardt & Schutte.
MADRID: J. G. Neville & Co.

struction throughout, with steel frame, brick side walls and iron roof covering, well lighted and ventilated. The steel work is being furnished and erected by the Berlin Iron Bridge Company, of East Berlin, Conn. Sandford & Stillman, of Jersey City, have the contract for the building.

T. W. Shepherd, a director of the Board of Trade, who has been on a committee to negotiate for a flour mill for Beaumont, Tex., has secured nearly enough stock to build a 125 barrel capacity mill at a cost of $12,500 for construction. Mr. Shepherd thinks the mill will be completed by winter or in time for this year's wheat crop.

Representatives of the Palmer Manufacturing Company were in New Brunswick, N. J., arranging for the erection of the new factory buildings for its plant, which will be built near New Brunswick as soon as the contract can be given out. The company has purchased a large tract of land just outside of New Brunswick and will found a new town to be known as Palmer.

The Electrolytic Marine Salts Company, at North Lubec, Me., has made sixteen shipments of bullion to the United States mint at New York, valued at $20,000. A 3 per cent. dividend has recently been declared on the stock issued—500,000 shares. A new plant of machines is in process of erection and when completed will increase the daily output to between $700 and $800.

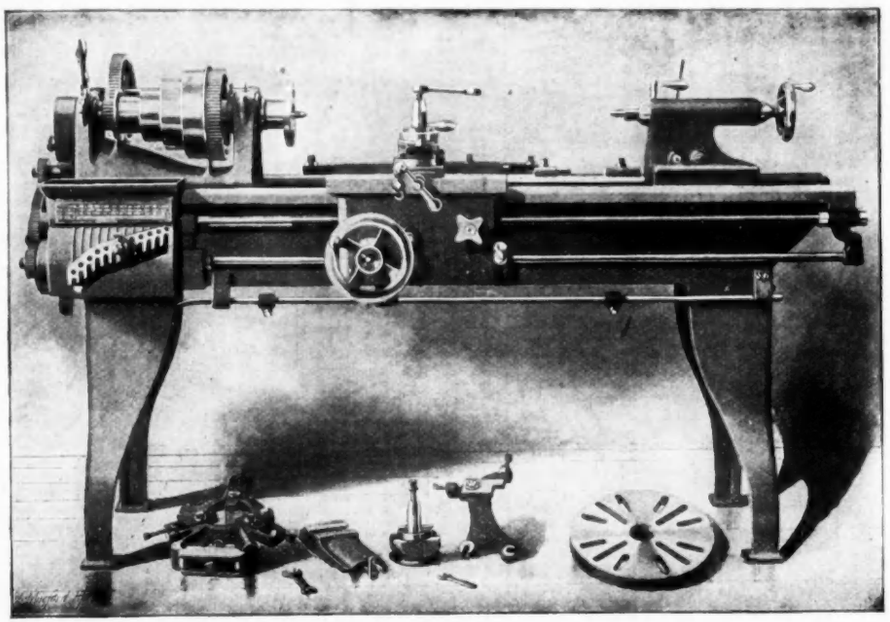
The Signal Manufacturing Company, with headquarters at Cleveland, Ohio, will establish its manufacturing plant at Despatch, N. Y., with permanent offices in the Chamber of Commerce Building, Rochester. The company has purchased five acres of land at Despatch and will begin building operations at once. The company will make a specialty of manufacturing various kinds of essential oils and products from seed.

The Conn Manufacturing Company has purchased a tract of land in Cedar Rapids, Ia., and will at once commence the erection of buildings. The plant will consist of a main building 48x96 feet, two floors and basement, with an addition of 20x32 feet in size. These buildings will be equipped with all the machinery needed for the manufacture of their goods. Their machinery will be run by a 40-horse power boiler and engine.

The location at Florence, Ala., of a large cotton seed oil mill and large machine shops is now practically assured. The cotton seed oil mill will be one of the largest plants of the kind in North Alabama. The machinery for the mill will cost from $15,000 to $20,000 and will be modern and up to date. C. W. Ashcraft is interested in the enterprise. The machine shops will not be so large an industry as the oil mill, but it will be an important one. The company is to be capitalized at $10,000, $5,000 to be paid in. Machinery to the amount of $4,000 will be put in and three-fifths of the stock will be taken by the citizens. The business league and citizens generally are interested in the location of these plants and every encouragement is being offered the promoters.

The National Boiler Works Company, of Syracuse, N. Y., was incorporated with the Secretary of State at Albany, with a capital stock amounting to $40,000. The objects of the company are to manufacture steam and hot water boilers, to construct steam and water power plants and to construct water towers. Its directors are: William H. Wood, of Medina, Pa.; Howard N. Babcock, of Syracuse; Henry T. Webb, of Skaneateles, and Robert Joy, of Oswego. The new company will occupy the plant formerly used by the Ranton Boiler Company, corner of Free and Third North streets. Work will be started by the new concern as soon as the plant can be put in shape and the necessary details incident to incorporation attended to. It is probable that the National Boiler Works Company will employ a large force of workmen.

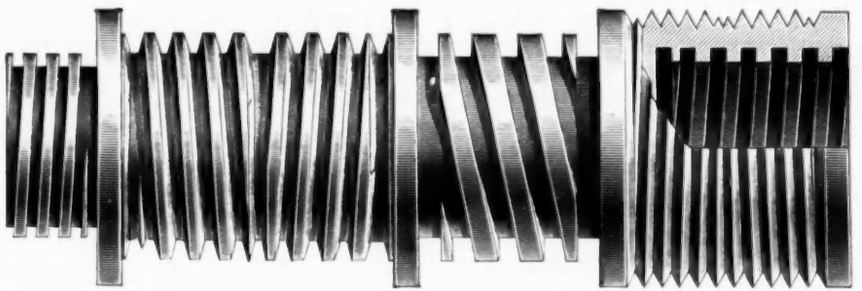
14 in. x 6 ft. Hendey-Norton Lathe.



THE HENDEY-NORTON ENGINE LATHE is the most modern type of engine lathe extant. Why? Because it has the best improved attachments known for the rapid and accurate production of high class lathe work in use on engine lathes at the present time.

One is the Norton arrangement of change gears for screw cutting. All the change gears are mounted in the gear box ready for use. The different pitches are obtained by the simple movement of handle in gear box from one notch to the other, carrying with it an intermediate gear meshing into the cone of change gears. Thus every thread required in ordinary use is obtained on the instant, and this applies equally well to the feeds.

Another is the reversing lever at side of apron. At the moment of changing travel of carriage, as when cutting threads, you have but to move up or down this lever when the *carriage*—not the countershaft, belt, head spindle and work—returns in the opposite direction, and so on till work is finished. This saves wear and tear on working parts. In this specimen of thread cutting we have a good illustration of the application of the above features; but it is here shown to illustrate in particular what our Automatic Stop will do. It shows how threads can be cut to and from shoulders, both internally and externally, tool stopping to a certainty, and with work in motion. This feature is equally applicable in turning work in duplicate. The Automatic Stop is at once positive and simple.



The Hendey Machine Co.,

Torrington, Conn.

AGENTS FOR THE PACIFIC COAST:
Pacific Tool and Supply Co., San Francisco, Cal.

J. W. Cregar, Philadelphia Bourse Exhibition.

EUROPEAN AGENTS:
Schuchardt & Schutte, Berlin, Vienna, Brussels, Stockholm.
Chas. Churchill & Co., Ltd., London and Birmingham, Eng.
Adolphe Janssens, Paris, France.

New Catalogs.

There are three sizes of Standard Catalogs, first authorized by the Master Car Builders' Association, 9" x 12", 6" x 9" and 3½" x 6". We recommend the 6" x 9" size for machinery catalogs. When they must be larger or smaller, one of the other standard sizes should be adopted if possible.

We have received from Patterson, Gottfried & Hunter, Ltd., New York, catalog and price list of shapers, presses, grinding and polishing, machines, etc. The catalog is standard size, 6x9 inches.

O. S. Walker, of Worcester, Mass., sends us catalog describing and illustrating magnetic chucks, which chucks are adapted for use on planers and lathes. The catalog is standard size, 3½x6 inches.

The Waterbury Machine Company, of Waterbury, Conn., has issued catalog "B" of wire drawing machinery and swaging machines. Some useful tables are also given. The catalog is 6x7 inches.

The Burt Manufacturing Company, of Akron, Ohio, has issued catalog of the Cross oil filter. The catalog contains a number of testimonials from those who have used this style of filter. The catalog is 3½x8½ inches.

We have received from the S. A. Woods Machine Company, Boston, catalog of wood working machinery, including planers, matchers, molding machines, saw tables, etc. The catalog contains 84 pages and is large standard size, 9x12 inches.

The Draper Machine Tool Company, Worcester, Mass., has issued Catalog B of screw-cutting lathes of various sizes, screw machines, boring mills, crank planers, etc. Illustrations of different styles of lathe rests are given. The catalog is standard size, 6x9 inches.

The Walker Company, Cleveland, Ohio, has gotten out a catalog showing some of the electric lighting plants installed by that company. The plants vary in size from the large plant at the Waldorf-Astoria Hotel, this city, to a plant suitable for a small office building. The catalog is 7½x10¼.

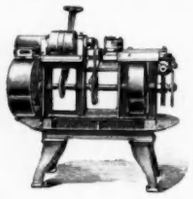
The Ingersoll-Sergeant Drill Company, New York, have sent us copy of advance sheets of catalog No. 41, devoted to the illustration and description of mining, tunneling and quarrying machinery. The catalog is nicely printed, and contains illustrations of the various applications of the machinery described. It is standard size, 6x9 inches.

We have received from the Massachusetts Fan Company, Boston, Mass., copy of Catalog D, which is devoted to the illustration and description of the Davidson ventilating fan wheel. The same company builds other forms of ventilating apparatus for use in mills, workshops and school houses. The catalog is 5¼x7¾, and will be sent to those interested upon application.

We have received from the Harrison Safety Boiler Works, Philadelphia, Pa., copy of catalog describing and illustrating Cochrane separators, which are used for removing liquids or solids from steam or other vaporous or gaseous currents. These separators are made in horizontal, angular and vertical forms. The catalog is tastefully gotten up and is 5¾x7½ inches.

We have received from the Lunkenheimer Company, Cincinnati, Ohio, copy of its illustrated catalog and price list for 1898. A large variety of valves, cocks, lubricators and fittings of practically every description are illustrated. In addition to the interesting nature of the catalog simply as such a number of tables, such as flange standards, areas of circles, etc., likely to be of service to those interested in the installation and running of steam plants. The catalog contains 208 pages, and is 4¾x7 inches.

Spencer Automatic Screw Machines



in eleven sizes, for Making Screws, Studs, Bicycle Hubs and other pieces of circular cross-section and various outlines from bars of round, square, or hexagon metal, in diameter 1/16 to 3 1/16 inches.

All needed adjustments are provided for. One boy may attend a half dozen machines.

Tools made to order. Nut Tapping, Screw Head Shaving and Slotting Machines.

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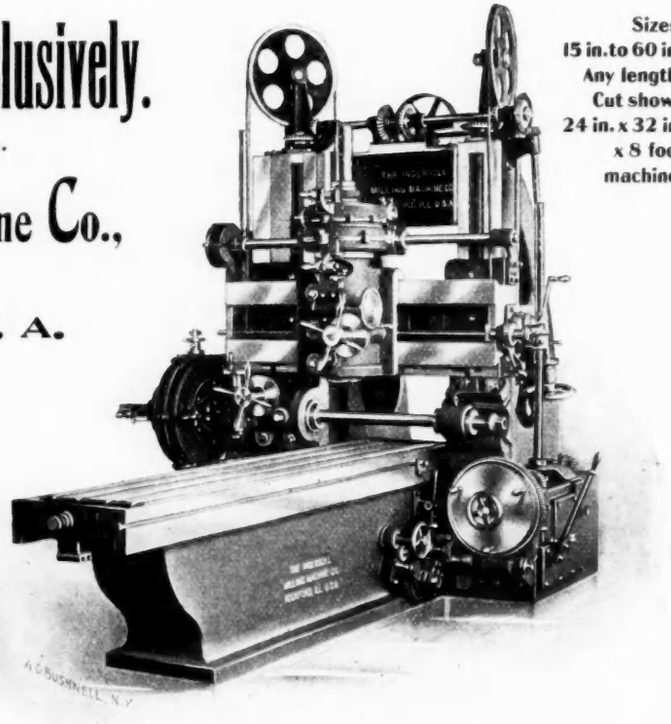

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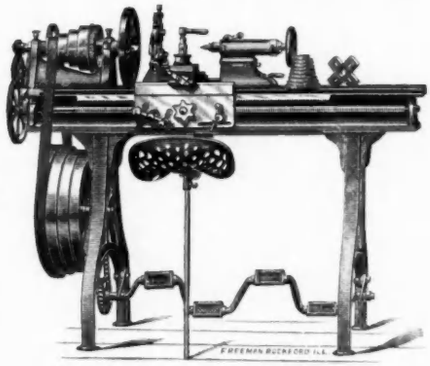

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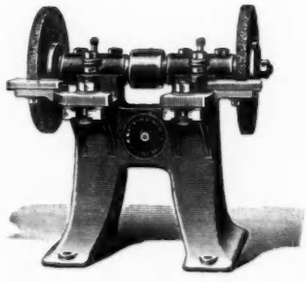

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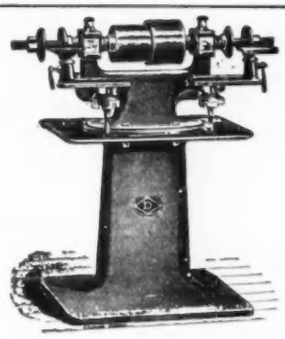

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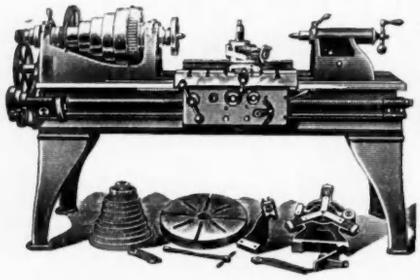

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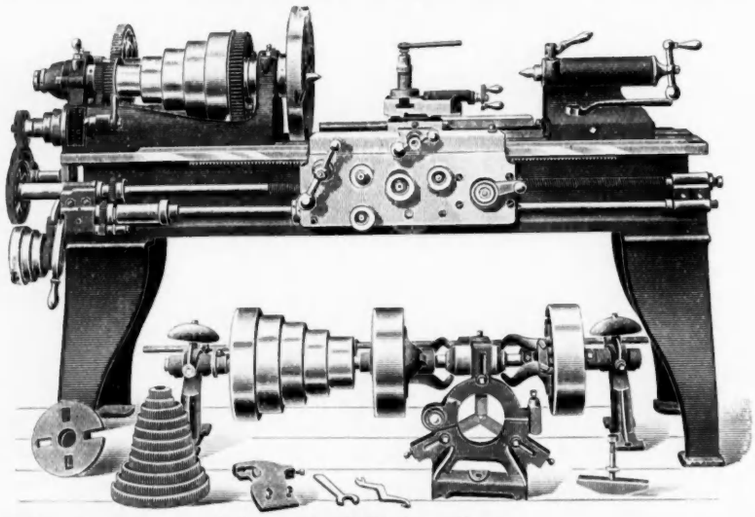

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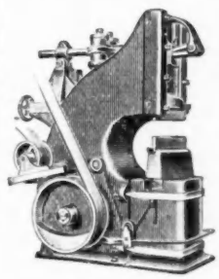

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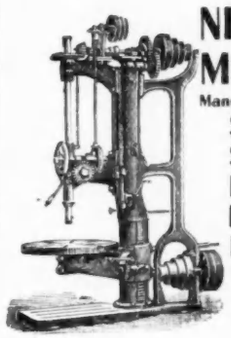

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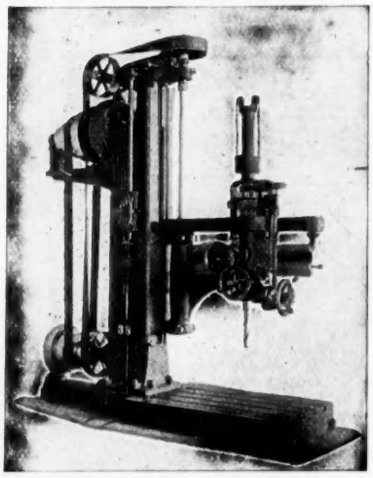

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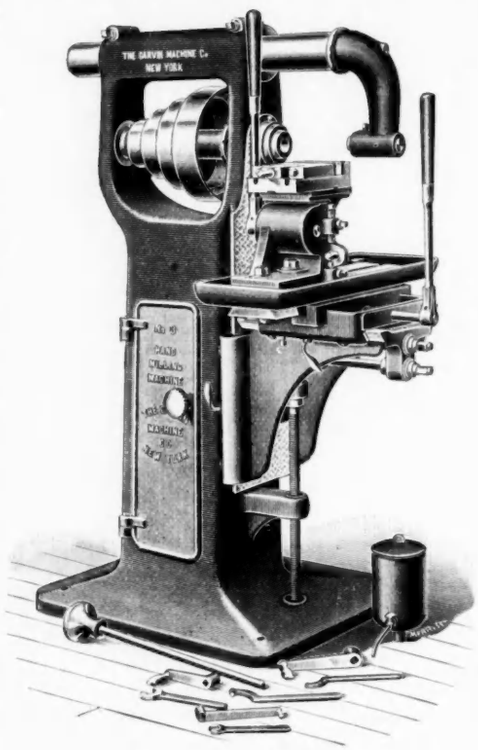

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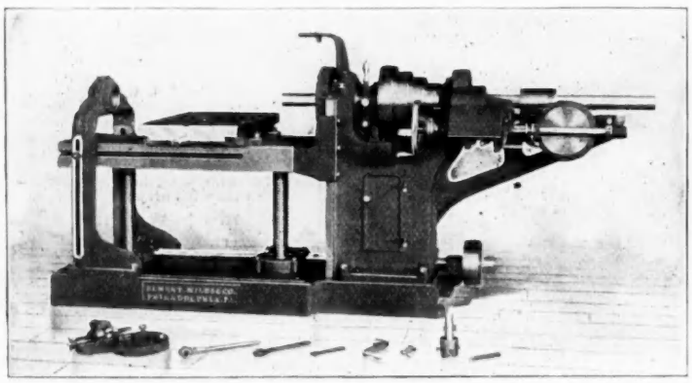
Some of the features of this machine are:



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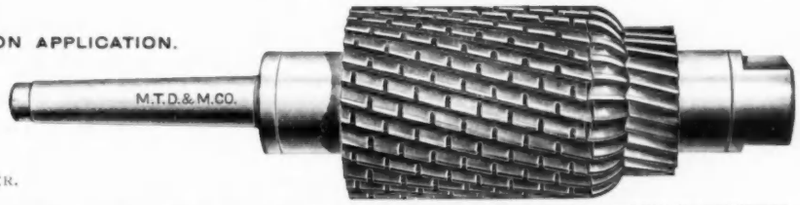

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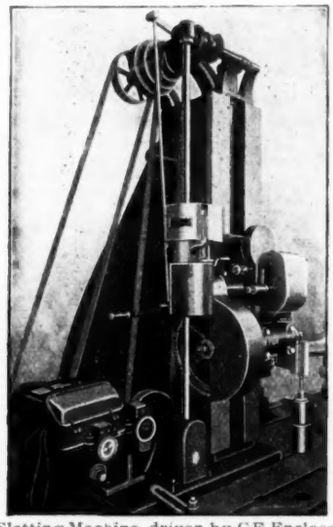

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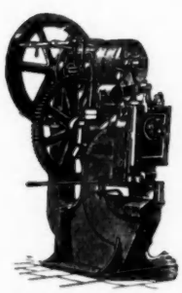

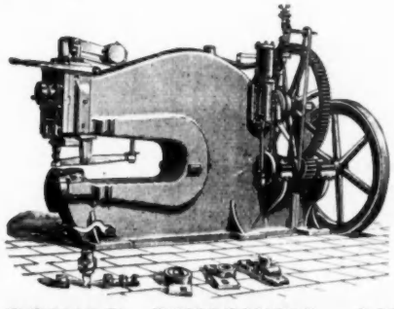

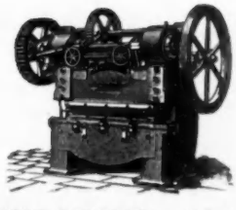

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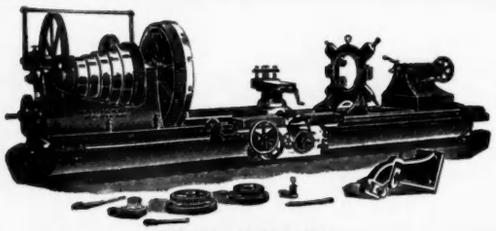

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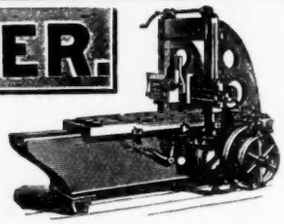

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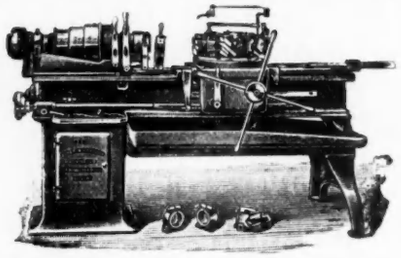

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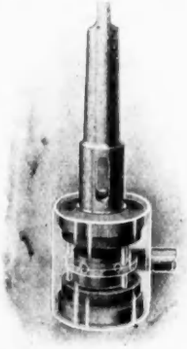

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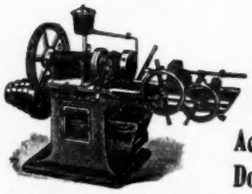

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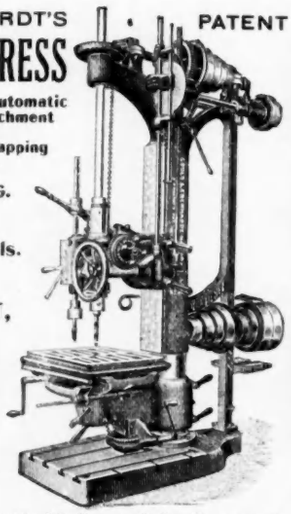

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